February 27, 2015

San Mateo County

Enterprise GIS Initiations and Planning

esri **Partner Network** Gold

ArcGIS for Local Government Specialty

ArcGIS Online Specialty

COUNTY OF SAN MATEO · FOUNDED 1856

7 Keys to GIS Success for the County of San Mateo

1 GIS Master Plan

Careful planning ensures broad organizational commitment and adequate funding, and minimizes common road blocks. It serves as a guide for staffing, data standards, training, and hardware and software purchases.

2 Coordination

This is the most critical characteristic of successful GIS programs. Most organizations will need to evaluate and implement the optimum governance model for managing and maintaining their GIS.

3 Quick Success

The earliest phases of GIS are typically the most expensive and the most important, but the least glamorous. High impact projects that can be implemented in the first year to help maintain enthusiasm and build credibility for GIS.

4 Education

Make sure users throughout the organization understand what GIS can do for them. Give users at all levels a preview of how they will soon be able to do their jobs more efficiently with GIS.

5 Ease of Use

Gone are the days when GIS was limited to a few highly trained power users. Make sure you implement intuitive, easy solutions so everyone can benefit. Some of the most widely accepted GIS applications are delivered to the public via the Internet.

6 Enterprise-Wide Implementation

Spread the responsibilities for GIS throughout the organization and offer all departments the opportunity to use the technology. GIS should be as widely used as a word processor, on every desktop in the organization. This approach helps turn data into valuable information.

7 Quantify Benefits vs. Cost

Providing savings in time, life, and money guarantees continued support and momentum. Make sure you invest resources on solutions that solve specific problems.

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GEOGRAPHIC
TECHNOLOGIES
GROUP®

February 27, 2015

Dear Selection Committee:

Geographic Technologies Group (GTG) understands that San Mateo County is seeking a qualified consultant to conduct a GIS Needs Assessment, develop a conceptual system design, and prepare an enterprise-wide GIS strategic implementation plan. We feel confident that our state, national, and international award winning GIS experience, and our expertise makes us the best choice for the County. Our qualifications include the following:

- We have created over <u>200 comprehensive GIS Strategic Plans</u> for local government
- A host of counties are using our comprehensive GIS plans to **<u>improve efficiency, increase productivity, save time, lives, and money</u>**.
- Our team has hands-on GIS planning and implementation experience. We know and understand the needs of local government allowing us to make **<u>practical, impactful, and workable recommendations</u>**.
- We have a comprehensive and successful <u>GIS implementation planning methodology</u> – including: (1) The Seven Keys that Guarantee the Success of Your GIS, (2) The Four Steps to Successful GIS Implementation, (3) <u>Identifying Optimum GIS Governance Models</u>, and (4) The Business case and Return-on-Investment (ROI) Strategy
- **<u>Outstanding references</u>** from towns, cities, and counties
- Extensive GIS <u>strategic planning publications</u> and presentation skills
- <u>GIS is all we do</u>. It is not a sub-discipline or add-on discipline.
- All we do is local government GIS. We don't focus on state and federal GIS, private GIS, or other non-related projects. <u>We are experts in local government</u>. Thus, we understand the processes and functions of every county department. We speak their language. This guarantees quick buy-in and enthusiasm from the user base.

The entire GTG team would like to thank you for allowing us to propose on this project. Our expertise in GIS and local government will provide San Mateo County with the very best plan. Should you have any questions during the review of the proposal, please call me at 919-344-2169.

Respectfully Submitted,

Mr. Curt Hinton, BA, MS, GISP (Authorized to Negotiate with San Mateo County)
CEO, Geographic Technologies Group
chinton@geotg.com
919-344-2169

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FIRM QUALIFICATIONS AND EXPERIENCE

"GTG was the unanimous choice of all of our users. There was no second choice for this project. GTG did a very thorough job in interviewing for needs. I would recommend GTG to any organization."

Orange County, California

Firm Qualifications and Experience

GIS Needs Assessment, Conceptual Systems Design, and Implementation Plan Clients

Orange County, CA: Population..................3,114,000

San Luis Obispo County, CA, Population 276,394

Forsyth County, NC; Population 361,220

Forsyth County, GA; Population 195,405

Gwinnett County, GA; Population 859,304

Carteret County, NC; Population....................68,434

Campbell County, WY; Population 48,176

Natrona County/Casper, WY; Population.......81,000

Indian River County, FL; Population 134,000

City of Pasadena, CA; Population 139,731

City of Guelph, ON Canada; Population 114,900

Town of Windsor, CA; Population 26,801

City of Hoover, AL; Population 83,412

City of South Bend, IN; Population.................100,800

City of Goose Creek, SC; Population...............38,579

City of West Sacramento, CA; Population......49,900

City of Sunnyvale, CA; Population 140,081

City of Unalaska, AK; Population 4,325

City of Dayton, OH; Population 143,355

City of Virginia Beach, VA; Population............448,479

City of Blue Springs, MO; Population 53,295

City of Boynton Beach, FL; Population 66,714

City of Titusville, FL; Population 43,761

City of Champaign, IL; Population 83,424

City of West Univ. Place, TX; Population 15,369

City of Chesapeake, VA; Population 230,571

City of Midland, MI; Population 42,181

City of Carlsbad, CA; Population.....................110,972

Geographic Technologies Group

Incorporated in 1997, Geographic Technologies Group® (GTG®) has a history of providing superior GIS solutions and support to organizations throughout the United States. Conceived and organized specifically to assist local government in planning, designing, and building award winning GIS solutions. GTG understands that GIS is not an add-on discipline; it requires a comprehensive and planned approach.

We Understand Local Government

GTG offers a comprehensive and insightful understanding of local government operations and has a cadre of experts

> **Total Staff** – 22 staff which all does consulting. No subcontractors.
> **Type of Organization** – S-Corporation
> **Experience** – Founded in 1997, created over 200 Strategic Plans

representing all areas of local government: planning, engineering, finance and information technology. GTG has worked with counties across the entire United States to evaluate existing practices and design optimum GIS solutions.

We Assess, Design and Plan

GTG delivers uniquely tailored solutions developed only after carefully analyzing needs, budget, goals, and resources. The Return on Investment standards ensure that our clients can evaluate the costs of implementation and set priorities. Our strategic implementation planning methodology is unique to the industry. When it is time to implement your plan, GTG will develop a framework that ensures hardware, software, data storage, best practices, responsibilities, and standards are clearly defined. GTG strives for continued improvement and client satisfaction by building feedback collection methods into all project plans.

We Have Outstanding Credentials

We have received state, national, and international awards for local government GIS implementation and, more importantly, we have earned the trust and confidence of America's most highly respected local government organizations.

Strategic Planning

Geographic Technology Group's (GTG) core competency is GIS strategic planning. Our team has built an outstanding reputation for understanding the operations and functions of local government, as well as planning, designing and implementing enterprise GIS solutions. GTG's Seven Keys That Guarantee Your GIS Success, is the methodology that has proven successful for many local government organizations. The seven keys to GIS success include:

- GIS Master Plan
- Coordination
- Quick Success
- Education

- Ease of Use
- Enterprise-Wide Implementation
- Quantify Benefits vs. Cost
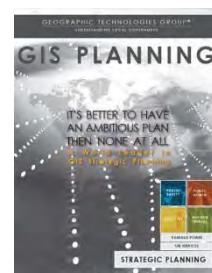
GIS Services

A comprehensive and reliable implementation of GIS technology often includes Information Technology (IT) framework design and implementation, application design, and software integration and deployment. GTG professional services staff offers the following:

- GIS Managed Outsourcing
- Database Design
- Data Creation
- Data Conversion

- GIS Consulting Services
- GIS Training
- Application Development

Public Safety

One of GTG's specific core competencies is planning, designing, and identifying and implementing optimum geospatial solutions for Public Safety. GTG has built an outstanding reputation for understanding the operations and functions of public safety organizations and offering the best GIS solutions. Delivering services quickly while leveraging all available data is mission critical - helping save time, lives, and money.
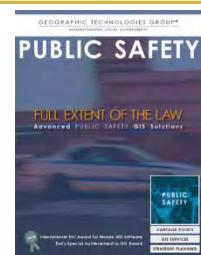
Public Administration

Geographic Technologies Group, Inc. (GTG) is one of the country's leading full-service local government GIS consulting companies. GTG's core competency is planning, designing, and building optimum solutions for local government. GTG has worked extensively with land administration and enterprise resource planning (ERP) solutions to offer the very best integrated GIS solutions on the market.

Public Utilities

Geographic Technologies Group, Inc. (GTG) understands utility operations and GIS technology. GTG has built an outstanding reputation for understanding GIS and the functions, operations and management of local government utilities, including: water, sewer, storm water, electric, and telecommunications.
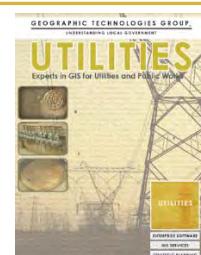
Project Team

Geographic Technologies Group, Inc. (GTG) is a full-service local government GIS consulting company. GTG has secured state, national, and international awards for GIS strategic planning, software products, and services. Founded in 1997, GTG celebrates more than 17 years of growth and success. Built on its tradition of deploying the very best GIS solutions for local government, GTG now has more than 500 clients. A corporate culture of quality, understanding, and commitment to our clients allows GTG to continue to build an outstanding local government GIS portfolio.

GTG has more than 20 professionals with extensive knowledge of and commitment to all aspects of the project. The proposed project team has exceptional experience and training as it relates to GIS assessments and planning. All project team members are employed by GTG and are qualified to perform all duties as specified in the Request for Proposal (RFP).

The GTG project team will be responsible for completing all services and tasks within the Scope of Work. GTG will not utilize any sub-consultants or sub-contractors as part of this project. GTG's level of experience is high for all services required for this project.

Joint Project Manager

Curt Hinton, GISP

25 Years of Experience

GIS Needs Assessment and Strategic Plans
Multiple Awards
100+ Clients

Joint Project Manager

David Holdstock, GISP

25 Years of Experience

GIS Needs Assessment and Strategic Plans
Multiple Awards
100+ Clients

GIS Solutions Manager

Matthew McLamb

7 Years of Experience

Strategic GIS Planning
ArcGIS Online Expert
Local Government Information Model (LGIM)
Architecture System Design

Figure 1.1 – Designated Project Team

Curtis Hinton, GISP – Joint Project Manager
President and Co-Owner of Geographic Technologies Group

Mr. Curt Hinton, BA, MS, GISP established an award winning company, Geographic Technologies Group, Inc. (GTG) in 1997 with business partner Mr. David Holdstock. Mr. Hinton has planned, designed, and coordinated the implementation of GIS technology for over 200 government organizations. As President of GTG, his duties include GIS Strategic Planning, client contact and satisfaction, and project technical supervisor. Mr. Hinton has a wealth of experience in enterprise GIS solutions and GIS for Local Government (Award winning solutions in the City of Wilson and Wilson County, NC).

- Partner and President of Geographic Technologies Group
- Public Safety Implementations for over 100 cities and counties
- Specializes in integrating GIS with existing information technology investments
- Former GIS Coordinator for the City of Wilson, North Carolina
- Won the URISA and American City and County Excellence in GIS Award

- Project Manager and lead writer for over 150 Strategic Plans
- Has hands-on experience implementing GIS for all city and county departments
- Was GIS Professional of the Year as voted by NC URISA
- Author of "Seven Keys to a Successful GIS"

David Holdstock, GISP – Joint Project Manager
CEO and Co-Owner of Geographic Technologies Group

Mr. David Holdstock, BA, MS, GISP established and incorporated Geographic Technologies Group, Inc. (GTG) in 1997 with offices in North Carolina, Texas, and Florida. Mr. Holdstock has planned, designed, and coordinated the implementation of GIS technology for over 200 government organizations. David has managed over 100 GIS strategic plans for towns, cities and counties, including many organizations with Electric and Water systems. As CEO, his duties include GIS management, GIS planning, assessment, design, and implementation, client contact, and project technical supervisor.

- Partner and CEO of Geographic Technologies Group
- Worked on over 100 Enterprise GIS Strategic Implementation Plans
- Twenty-two years of GIS experience
- Extensive experience in GIS for Utilities, Electric, Water, Public Works, and Engineering
- Extensive Publications

- Former GIS Manager for world's leading Transportation Engineering Company – PPQD, NY
- Extensive publications and presentations on GIS for local government and Utilities
- Operations
- Certified GIS and GPS Trainer
- GIS/GPS Program Director at NCSU – ITRE

Support Staff

Supporting the project team is a cadre of GIS and IT experts that are currently employed by GTG. The following tables represent additional resources available to assist the assigned project team.

Strategic Planning and Consulting
David Lyons, BA, GISP – Project Management, ArcGIS Server Admin, Esri Geodatabase Management, Python, SQL Server
Johnathan Welker, BS, MS – ArcGIS Online for Local Government, Python Scripting, Database Design, Mobile Technology
Jessica Susich, BA – Senior GIS, Data Creation, and Conversion Expert

IT Assessments and Technical Expertise
Jason Cope, BS – Chief Programmer Project Management, VB.Net, HTML5, Esri Arc Objects, ArcEngine, Python, SQL Server, Db2, Oracle, Postgre
Steve Hamlett, AA – Chief Programmer, Project, Management, VB.Net, C#.Net, Java/Java Script, HTML5, Esri ArcObjects, ArcEngine, ArcGIS Runtime for WPF, ArcGIS Runtime For iOS, ArcGIS Runtime For Android, Python, SQL Server, Db2, Oracle, Postgre
Julio Garrido, BS – SQL And Database Expert

**Organizational Chart**
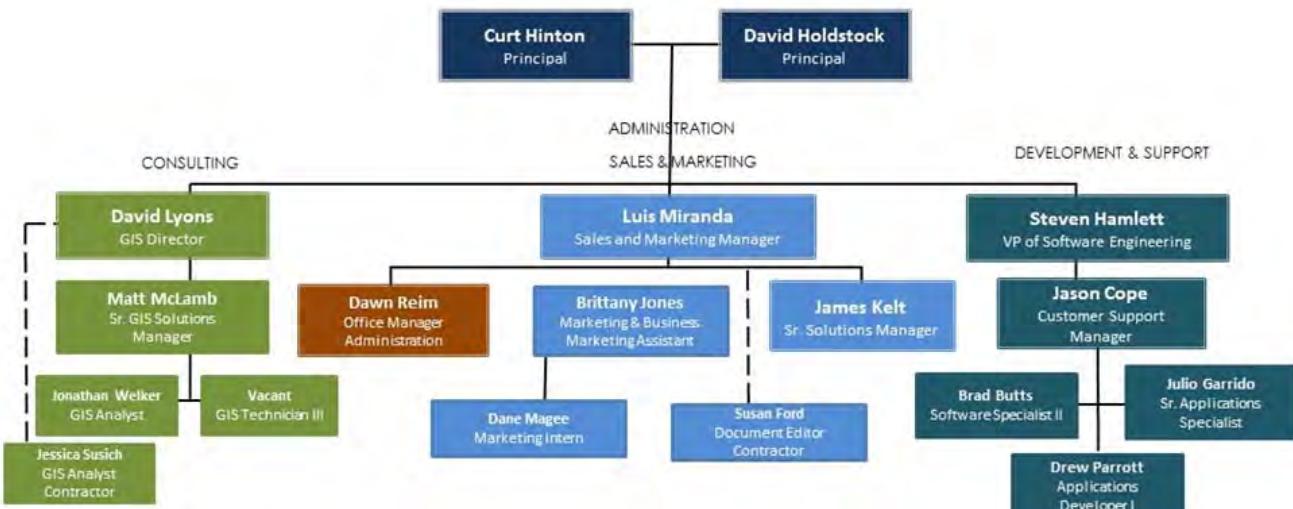
Figure 1.2 – Company Organization Chart

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PROPOSED
APPROACH

"GTG is by far the best GIS company-period! They gave us a clear path to success with their needs assessment and implementation plan and have been there every step of the way to ensure that our enterprise-wide GIS is a success."

San Luis Obispo County, California

Proposed Approach

Geographic Technologies Group (GTG) understands that San Mateo County is seeking a consultant to conduct a comprehensive GIS needs assessment, develop a conceptual systems design, and prepare an implementation plan for the County's enterprise GIS. The County requires an experienced "GIS strategic planning" consultant that can assess the current state of the County's GIS program, conduct comprehensive needs assessment interviews, leverage the identified stakeholder commonalities, focus on identified business goals, assess technological readiness, assess database readiness, assess organizational readiness, provide a training and education plan, and provide an implementation plan. The following are **10 key assessment requirements** and objectives based on the Request for Proposals (RFP):

1	Assess the current state of the County's GIS – Identify GIS business objectives and current business processes/workflows
2	Survey the internal GIS customer's (Stakeholders) needs and develop a gap summary
3	Assess the quality, quantity and completeness of the County's existing GIS data layers – GIS database readiness to meet GIS business objectives
4	Detail and document what is working, what should be improved, and what should be added or discontinued. This may include a SWOT analysis.
5	Detail and document a plan to support and educate the enterprise. This will include staffing analysis, a training and education plan, and a support plan.
6	Perform a comparative benefits analysis of other similar organizations as it relates to GIS functionality and implementation -
7	Provide GIS governance and staffing recommendations for the future growth of San Mateo County – Determining organizational readiness to meet the GIS business objectives.
8	Provide recommendation as to optimal hard ware and software to meet the business needs of the organization.
9	Detail best "GIS Business Practices" as it relates to technical, tactical, logistical, and strategic needs of San Mateo County.
10	Identify and present the "value proposition" of GIS in local government. This would include GTG's 16 Return on Investments (ROI) strategies.

San Mateo County needs a qualified consultant with demonstrated experience in developing and implementing successful comprehensive GIS strategic plans. It is expected that the comprehensive GIS assessment will include an assessment and analysis of every opportunity afforded by GIS leading to recommendations for improvements and sustainability.

Project Methodology

GTG's detailed project methodology includes some key strategic planning components which are essential to the success of the project and is based on GTG's extensive experience in GIS strategic planning for local government and GTG's award winning local government GIS focus. The project will include a careful evaluation of the needs of all departments and stakeholders, and the creation of a Final Implementation Plan Report that will guide the continued development of the County's GIS program. This will ensure that the GIS program grows in a structured, optimum manner, serving all departments. To effectively execute the comprehensive GIS Strategic Plan, GTG will utilize a three (3) phased approach as follows:

Phase I: GIS Needs Assessment
- Access the current state of the County's GIS Program
- Assess the general quality of the existing GIS data sets and recommend an improvement program as needed
- Survey internal customers' needs and develop a gap strategy to include; business processes/workflows, challenges, and expected outcomes to overcome gaps
- Conduct a short-term and long-term Return-on-Investment (ROI) analysis
- Identify and summarize what is working, what should be improved, and what should be added or discontinued. Identify gaps between current business processes and future needs

**Phase II**: Conceptual Alternative Systems Design
- Comparative analysis of GIS functionality that is commonly used in other cities but not in San Mateo County, including recommendations on benefits and implementation
- Analyze and identify requirements for hardware, software, networking, communications, mobile GIS, and public facing GIS
- Identify a strategy to manage all needed data and the best methods for design, organization, and sustainability
- Provide recommendations on GIS program staffing relative to the needs identified by line departments and an overall move-forward Governance Strategy

Phase III: Implementation Plan
- Outline GIS best practices relative to system and data management, including design and management of production and test environments, data development and quality control, the staging of upgrades, and data management
- Identify opportunities for improved functionality or efficiencies through the use of GIS
- Develop a training and education plan
- Identify all components needed for further implementation of GIS to include costs and scheduling.

The following seven steps will guide the GIS Strategic Plan –
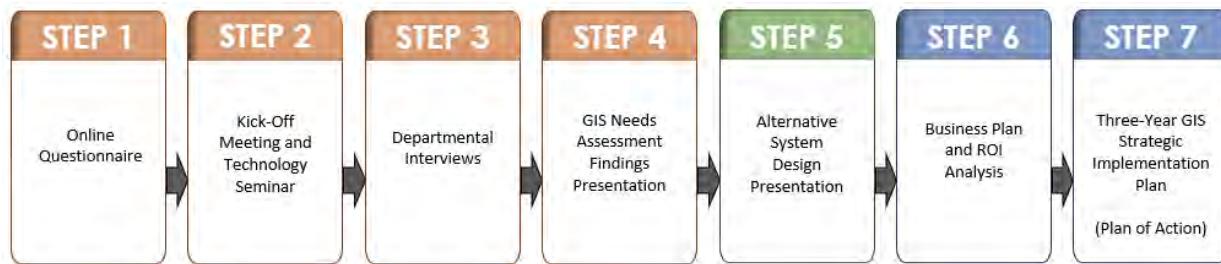
GTG recognizes that a "tried and tested" planning methodology and project approach is required for successful completion of the comprehensive GIS assessment. GTG offers the *Seven Keys to GIS Success,* which will help guide this project and make the process understandable to San Mateo County. These *Seven Keys* were developed by years of implementing GIS for local government and visiting over 500 local government GIS implementations throughout the United States. The *Seven Keys* are the items that are commonalities between all of the most successful enterprise-wide GIS implementations in the nation.

Figure 2.1 Seven Keys

The absence of one or more of the keys (see figure above) will greatly reduce the effectiveness of an enterprise-wide GIS. The process of sustaining and managing a successful GIS program for the County must include each of the seven keys:

(Key 1) The development of a **Master Plan,** (Key 2) An effective **Coordination** or Governance strategy, (Key 3) Identify and Showcase **Quick Successes**, (Key 4) A comprehensive strategy for ongoing **Education** and Training, (Key 5) Make it **Easy to Use**, (Key 6) Implement a true **Enterprise-wide** solution, and (Key 7) **Quantify the Benefits and Costs** – with special emphasis on the sixteen Return-on-Investment (ROI) categories developed by GTG.

GTG has developed a methodology that includes three phases and seven steps. The following are the proposed steps to successfully complete a comprehensive GIS Strategic Plan for San Mateo County:

Phase I: GIS Needs Assessment

- **STEP 1** – Online Questionnaire – GTG will make available to the County an online questionnaire to be completed by representatives of each County key stakeholder department.
- **STEP 2** – Kick-Off Meeting and Technology Seminar – GTG will conduct a one to two hour "GIS for Local Government Seminar" with the County.
- **STEP 3** – Departmental Interviews and Consensus Building – GTG will meet with key representatives of each County stakeholder department and conduct a GIS Needs Assessment interview.
- **STEP 4** – GIS Needs Assessment Findings Presentation – Existing GIS conditions and future recommendations presentation to the County.

Phase II: Conceptual Alternative Systems Design

- **STEP 5** – Alternative System Design and Presentation – GTG intends to develop three alternative system level designs. These alternative system designs will meet, all of the needs of the County in terms of performance, effectiveness, sustainability and economics.

Phase III: Final Assessment Report

- **STEP 6** – Business Plan and ROI Analysis – GTG will develop a GIS Business Plan that will outline the project goals and objectives, the reasons they are believed to be attainable, and the plan for reaching those goals.
- **STEP 7** – Final Implementation Plan (Plan of Action) – GTG will develop a Final Assessment Report that identifies the information developed during the assessment, and includes the recommended changes to the County's GIS program.

Scope of Services

GTG understands that the County has been using GIS technology successfully for many years and has made significant investments in its GIS and IT infrastructure. GTG also recognizes that the following facts will have a bearing on the comprehensive GIS assessment:

- The County provides a **full range of services** that lend themselves to extensive GIS and related technology.
- The County has a central GIS team within Information Services Department (ISD). The GIS team provides help desk support, GIS services, develops and maintains custom and off-the-shelf applications, maintains the enterprise database, provides a variety of technical services, and maintains key enterprise-wide data layers.
- The County utilizes a networked governance model to meet stakeholder needs.
- The County uses **Esri software**, including all the tiers of applications. Additionally, the County utilizes a number of Intergraph products (GeoMedia and GeoMedia Webmap). Oracle 11g including Oracle Spatial is used as the database backend.
- The **current computing environment is robust and comprehensive – including an alternate data center**. The County has twenty-two departments spread over thirty locations that will influence the recommendations made in the Final Assessment Report.
- There is a desire to consolidate mapping and GIS functions to allow for best-of-breed mapping standards.
- GIS Business Goals include:
  o Amplification of GIS expertise and ISD capabilities
  o Promotion of authoritative data sources
  o Simplification of access and sharing
  o Empowerment of County workers
  o Optimization of GIS governance
  o Establishment of an optimized GIS platform
  o Identification and implementation of GIS best practices

GTG will focus on the key issues of implementation including; strategic, tactical, technical, and logistical issues. GTG has developed a scope tailored around the County's RFP. GTG has also introduced some new, successful strategic planning options. The goal will be to use this proposed scope of services to guide the comprehensive GIS Assessment for the Final Assessment Report for San Mateo County.

The following scope of services is based on GTG's understanding of comprehensive GIS Strategic Plan as described in the Request for Proposal, combined with GTG's years of experience providing award-winning local government solutions. The project's scope has been modified to include some key components which are essential to the success of this project. It includes the three phases and seven steps listed above. The proposed project scope is as follows:

PHASE I: GIS Needs Assessment

STEP 1

Online Questionnaire

STEP 1 – **Online Questionnaire** – GTG will conduct a needs analysis that will document the current state of GIS Countywide, and detail the needs of all stakeholders. GTG will review the County's existing GIS systems, resources and activities. GTG will initiate the comprehensive GIS assessment by using an online questionnaire. The questionnaire will be tailored to the specific needs outlined by the County. It will focus on all important information required for the development of the Final Strategic Plan. Questionnaires will be delivered to all departments one to two weeks before GTG conducts departmental interviews. Please see **Figure 1** in Appendix for proposed Online Questionnaire. The Online Questionnaire addresses the key components of any successful GIS assessment including –
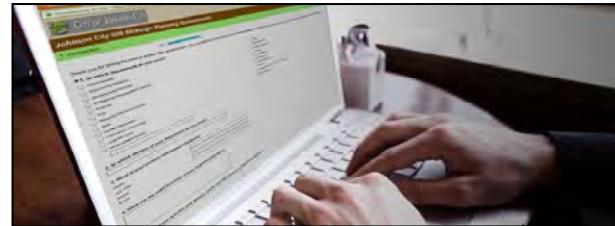
Governance	Data & Databases	Procedures & Workflow	GIS Software	GIS Training	Infrastructure

Key elements of the questionnaire are as follows:

A. **Existing Conditions**
- Departmental Overview – current responsibilities and activities
- Departmental Structure – current size, number of divisions and employees

B. **Governance of GIS** – what level of GIS is currently in place within your department/division
- Current and desired activities that involve GIS
- Current and desired activities that involve databases (both paper- and computer-based data)

C. **Hardware and Software**
- Organizational issues and plans concerning computer use and sharing data across departments

D. **GIS Data Layer Inventory**
- What current GIS data layers are available, and what layers your department is responsible for maintaining
- What future data layers are needed

E. **Departmental GIS Gap Analysis**
- Analysis of current workflows that influence the GIS

GTG will assess the current status of all departments regarding the following:
- Current Data and Databases
- Governance Structure
  - GIS and related technology Staffing

- o GIS-related coordination between departments
- o Other issues and concerns
  - Lines of Communication
- Existing Software and Hardware
- Business Processes and Work Flow Evaluation
- A Gap Analysis
- Software Applications
  - o Custom
  - o Off-the-shelf Solutions

Deliverables – Online Questionnaire

Milestones – GTG understands the assessment is expected to address all issues pertaining to the successful development of the GIS Strategic Plan.

Figure 2.2: Example of the results from a GIS Assessment Online Questionnaire
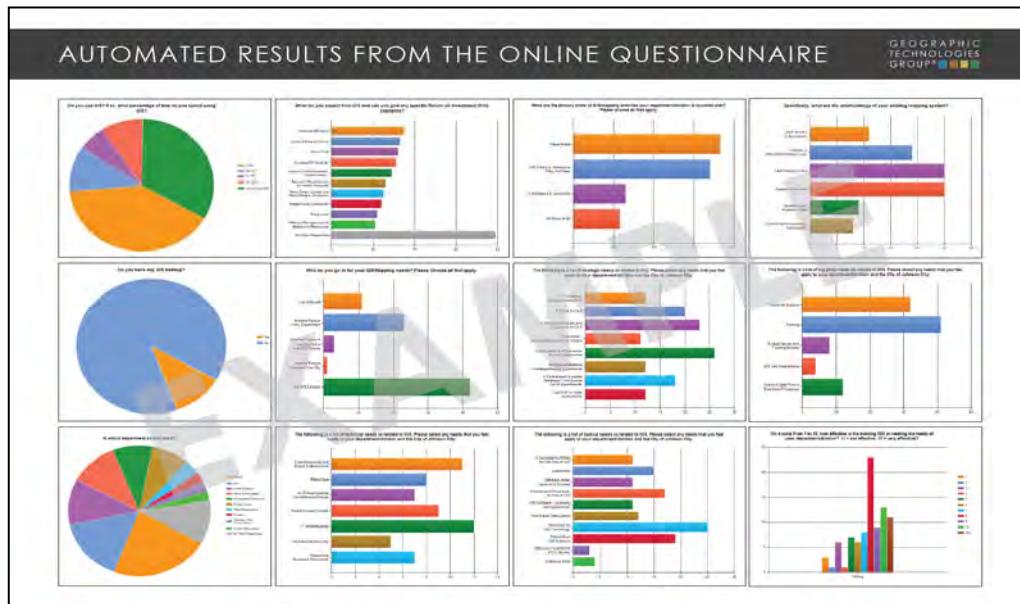
Figure 2.3: Example of Summary of Findings from an Online Questionnaire

STEP 2

Kick-Off Meeting and Technology Seminar

STEP 2 – Kick-Off Meeting and Technology Seminar – GTG will employ its industry knowledge and experience to conduct an on-site Kick-off Meeting and GIS Technology Workshop for all potential GIS users within the County. The combined kick-off meeting and workshop will last one to two hours and provide an opportunity for early interaction with GTG owners, Mr. David Holdstock and Mr. Curt Hinton, to establish a working relationship, explain the nature of the GIS strategic plan, its benefits, and the scope of the planning process.

Deliverables – On-Site Meeting project Kick-off meeting agenda, "GIS Organizational Needs" presentation, "7 Keys to GIS Success" and "4 steps to GIS Implementation" presentations

Milestones – The kick-off meeting and technical seminar will introduce GIS and geo-spatial technology, describe the existing status of GIS within the County, outline the goals and objectives of the project, emphasize and focus on "consensus-building," listening and documenting the needs of all departments. GTG will introduce many examples of how other County organizations are using GIS technology to benefit the organization.

Figure 2.4: Kick-Off Meeting and Technology Seminar

GIS PROJECT KICK-OFF MEETING AND TECHNOLOGY SEMINAR
San Mateo County – COMPREHENSIVE GIS ASSESSMENT

A. **INTRODUCTION TO GEOGRAPHIC TECHNOLOGIES GROUP (GTG)**
   a. GTG's State, National, International GIS Awards
   b. Project Team's GIS Experience and Competence in GIS Strategic Planning
   c. Two Owners and Resumes of Team
      i. Publications and Awards

B. **WHAT IS GIS?**
   a. Components of an enterprise solution
   b. Functions and uses within County government

C. **THE GIS NEEDS ASSESSMENT AND STRATEGIC IMPLEMENTATION PLAN**
   a. Project Goals and Objectives
      i. Needs Assessment
      ii. System Design
      iii. GIS Strategic Implementation Plan
      iv. Project Schedule
         1. Milestones and Deadlines
   2. Important role of stakeholders
      v. Project Methodology
         1. **The Seven Keys to GIS Success**
         2. **The Four Main Steps** to GIS Implementation
         3. **GIS Governance Options** - "A Management Strategy"
         4. GIS **Needs Assessment Interview Process** and Interview Guide and On-line Questionnaire

D. **AN ENTERPRISE GIS VISION AND GOALS AND OBJECTIVES**

E. **CRITICAL ISSUES FOR BUILDING A TRUE ENTERPRISE GIS WITHIN SAN MATEO COUNTY**
   a. **Best Business Practices and Case Studies**
      i. Enterprise GIS Architecture
      ii. Governance Models
      iii. Cost Sharing Models
      iv. Organization Examples – see 10 municipal example**s**

F. **SAN MATEO COUNTY'S GIS COMPREHENSIVE ASSESSMENT**
   a. The End Product – Developing the roadmap for San Mateo County

G. **QUESTIONS AND ANSWERS**

STEP 3

Departmental Interviews

STEP 3 – Departmental Interviews – GTG will conduct interviews with all identified County departments and users identified in the RFP including all current GIS technology users, and key non-using GIS departments. GTG will document each stakeholder's and non-stakeholder's roles within the County, and identify opportunities for GIS technology.

GTG will perform a "Business Process Analysis" for each department. This task will help define the business activities and workflows associated with the use of GIS and allow GTG to document the organizational benefit of the GIS program. The business process and workflow analysis will be the mechanism by which the overall requirements and needs analysis are explored and documented. GTG has extensive experience in describing and detailing the existing business process, and developing and storyboarding the future application of geo-spatial technology. This process will allow GTG to identify gaps between current business processes and future needs. Each department will have the opportunity to review their departmental needs assessment for completeness and accuracy. GTG understands that departmental buy-in is critical. Once all of the needs assessment departmental documents have been finalized with the departments, GTG will create a departmental Goals and Objectives summary that will identify each need, priority, cost, and achievability. This will allow us to derive a total quantification to determine departmental priorities. An additional factor called Organizational Imperative will be identified. This is a case in which the element must be implemented due to some mandate, law, or directive regardless of the quantification from the other categories.

These Departmental Goals and Objectives will allow us to identify and organize the overall Goals and Objectives for the entire County (Figure 6).

Departmental Goals and Objectives Community Development

GIS NEED	Priority 1-5	Cost 1-5	Achievability 1-5	Total	OI*
Department-Wide Access To Geospatial Data	1	1	1	3	N
Public Access to Geospatial Data (Story Maps) (Development Projects)	0.5	2	2	4.5	N
Formal GIS Training for Department Staff	1.5	1	2	4.5	N
GIS Job descriptions	1	1	3	5	N
Enabling Existing Databases (SunGIS, Access Files, HdL)	1	2	2	5	N
Public Forum Neighborhood and Vicinity Mapping	3	1	1	5	N
Mapping and Spatial Analysis of Department Data	1	2	3	6	N
Field Access To Geospatial Data	3	2	1	6	N
GIS Enable Affordable Housing Resource Inventory	2	3	2	7	N
County parcel update process/data cleanup	1	2	5	8	N
Advanced Analysis Tools (Network, Spatial, 3D Analyst)	5	2	1	8	N
GIS Enable the Heritage Inventory	5	2	2	9	N

Figure 2.5 – Departmental Goals and

Figure 2.6 – Enterprise Vision, Goals and Objectives

Additionally, GTG will identify and quantify the Strategic, Tactical, Technical, and Logistical needs identified through the Needs Assessment (Figure 7).
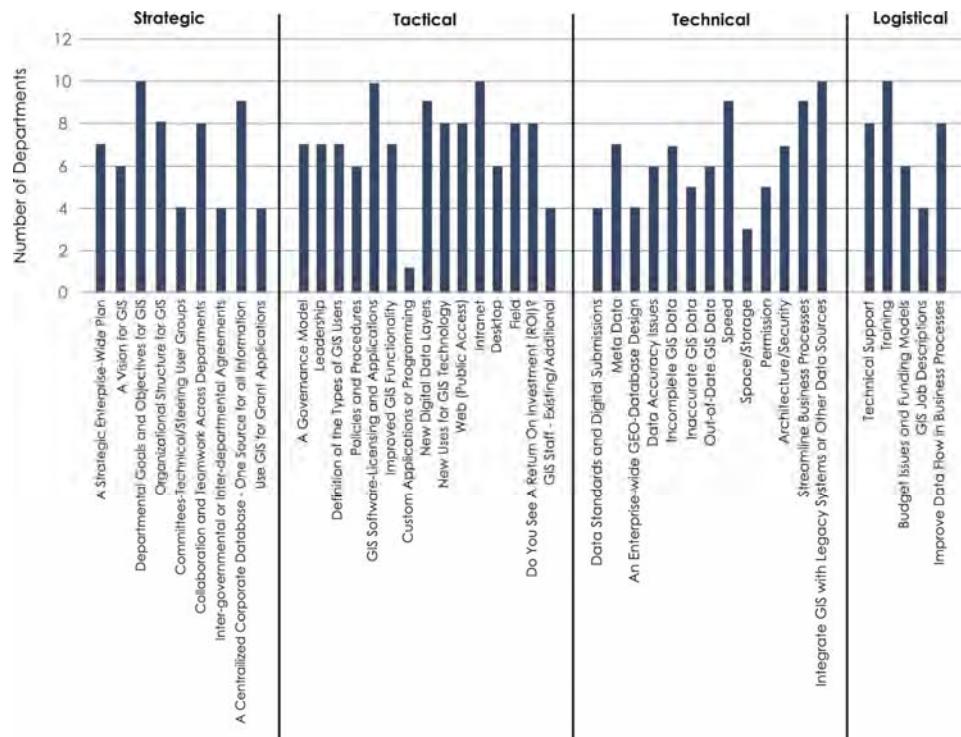
Figure 2.7 – Overall Needs Quantification

Deliverables – Group interviews, personal interviews, telephone interviews, follow-up interviews, on-line surveys, data flow and forms collection, and email communications.

- Comprehensive Needs Assessment Report (Chapter One of the Overall Plan)
- GIS Vision, Goals, and Objectives Report (Chapter Two of the Overall Plan)

STEP 4

GIS Needs Assessment Findings Presentation

STEP 4 – GIS Needs Assessment Findings Presentation – GTG will evaluate and assess all the information gathered in Step 1 and Step 3. All questionnaires and interviews will be summarized and documented. GTG will produce a "GIS Needs Assessment Report" that will document and discuss the key implementation issues and Departmental needs.
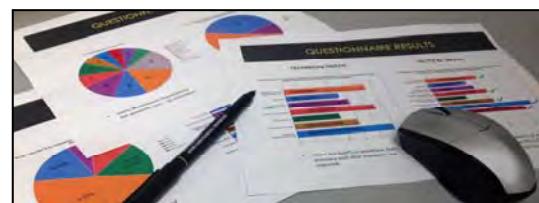
GTG will present all findings and recommendations to the County. This briefing will include an executive level summary that will include a one hour power point presentation and an opportunity for discussion and feedback. GTG will also give a one to two hour "GIS Needs Assessment" presentation to all County departments and stakeholders. This will allow all interested parties to provide feedback and comment on the documented needs.

Deliverables – Detailed Power Point Presentation "GIS Assessment" and "GIS Needs Assessment Report"

Milestones – All questionnaires and interviews will be summarized and documented in Phase I. The conclusion of Step 4 marks the completion of Phase I.

PHASE II: Conceptual System Design

STEP 5

Alternative System Design Presentation

STEP 5 – Conceptual Alternative System Design – The Conceptual Alternative Systems Design will establish the design criteria to meet all of the needs of San Mateo County. GTG intends on developing alternative system level designs. These alternative system designs will meet, to a greater or lesser extent, all of the needs of the County in terms of performance, effectiveness, sustainability and economics.

GTG will design a conceptual enterprise GIS around the needs, priorities, and constraints of San Mateo County. GTG will perform the following tasks:

Governance Strategy (Key Component of the Organization Readiness Assessment) – GTG has done in-depth studies of GIS Governance and has written and presented extensively on the topic. An exhaustive look a Governance options for the County to include:

- Governance principles, definitions, and concepts
- Enterprise organizational models and options
- Details of the current governance structure
- Departmental, GIS Team, and ISD responsibilities
- Desired outcomes
- Gap analysis
- Recommended actions
- SWOT Analysis
- Guidelines to ensure all organizational structures are in place to establish data ownership, accuracy, and security
- Steering Committee and User Group Recommendations

Figure 2.8 – Governance Recommendations
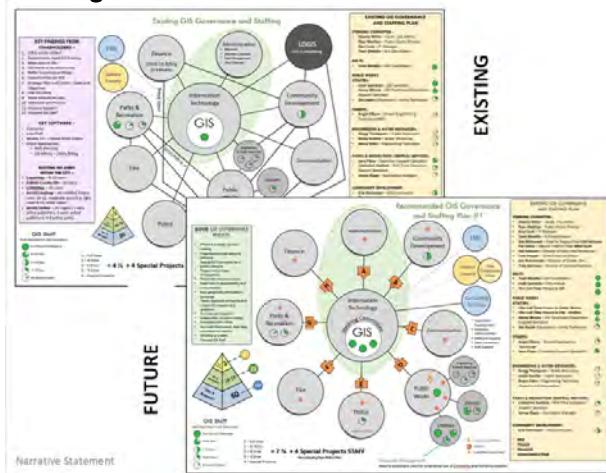
Deliverables – GIS Governance Plan and Recommendations (Chapter 3 of the Overall Plan)

Enterprise GIS Database Readiness Assessment – GTG is the leading GIS Strategic Planning company in North America. One of the key elements of our assessments is a thorough assessment of existing data, data structure, database design, and how GIS integrates with existing IT systems. We have integrated with hundreds of local government IT systems and have a group of integration experts that will assist on this critical project component. Data review and database recommendations include:

- Data layer maintenance and organization
- Database design elements and review of current database design
- An analysis of Esri Local Government Information Model (LGIM) and how it fits into San Mateo County's GIS efforts
- A review of how Esri's ArcGIS for Local Government platform can be leveraged for the County to include database design considerations
- The creation of a master data list (MDL) that includes existing data and desired data. This MDL review will include categories that define; the data layer, creation methodology, recommended update division or individual, layer states (existing, recommended, partial), recommended grouping within the database design, and recommended update frequency (See Figure 9)
- Data usefulness to meet business objectives will be analyzed and prioritized
- An in-depth analysis of key base layers. Our team will examine a number of key base layers in detail in an effort to evaluate its completeness, accuracy, topology, and to make recommendations on how best to move forward with these layers. Typical layers include; parcels, street centerlines, aerial photography, address points, and other key layers.

Data Layer	Creation Methodology	Recommended Update Division or Individual	Existing or Recommended?	Recommended Data Grouping (Feature Datasets)	Recommended Update Frequency
Block Map Grid	Converted from Paper Maps and Some On-Screen Digitization	IT Staff / ESD	Existing	Custom FD	As Needed
Borregas Bridges	Digitize	Public Works	Existing	Reference Data	As Needed
Building Footprints	Digitize on Screen	Central GIS Group	Partial	Reference Data	Yearly
Building Inspector Area	Digitized	Community Development Department	Existing	Reference Data	Yearly
Building Layout	Link to GIS	Public Works	Desired	Reference Data	Yearly
Building Schematics	Scanned from Floor Plans	LCSD Staff in Coordination with GIS Staff	Recommended	Raster Data	As Needed
Buildings with Site Plans	Scanned and linked to GIS	Community Development Department	Recommended	Raster Data	As Needed
Bus Routes	Digitize on Screen	County	Partial	Reference Data	Monthly
Business Licenses	Data Integration	Community Development and Central GIS Group	Recommended	Custom FD	Daily
Bus-stop – Countywide	Digitize	VTA	Existing	Reference Data	Quarterly
Calls for Service	Extract, cleanse and automatically map from public safety databases.	Automated	Existing	Citizen Service	Daily
Caltrain stations -poly	Digitize	VTA	Existing	Reference Data	Yearly
	Identify on parcel record in	Various (in CDD;			

Figure 2.9 – Master Data List Example

Deliverable – GIS Database Assessment, Conceptual Database Design, Master Data List, and Base Layer Evaluation (Chapter 4 of the Overall Plan)

GIS Software Solutions (Key Component of the Technology Readiness Assessment) – GTG is comprised of a group of technologists that are deeply engaged with geospatial technologies. As such, we assist numerous organizations with determining the best software solutions to meet the needs of the organization and constituents. The following are elements that our team will detail in regards to software solutions:

- Deploying enterprise solutions (key components that must be addressed)
- Detailed review and summary of existing applications
- An assessment of existing products and a detailed best path forward to meet user needs
- Recommendations for end-user applications to include desktop and intranet
- Recommendations on how to integrate existing IT systems with GIS (See Rio Rancho Article in the Appendix for an example of GIS and IT integration)
- Recommendations on best options for public facing applications
- An analysis on how ArcGIS Online fits into the organization – when and where it should be deployed
- Analysis and recommendations for mobile solutions
- Analysis and recommendations of new desktop tools from Esri (Address Data Manager, Date Reviewer, Special Event Planning, CIP Planning, etc.)
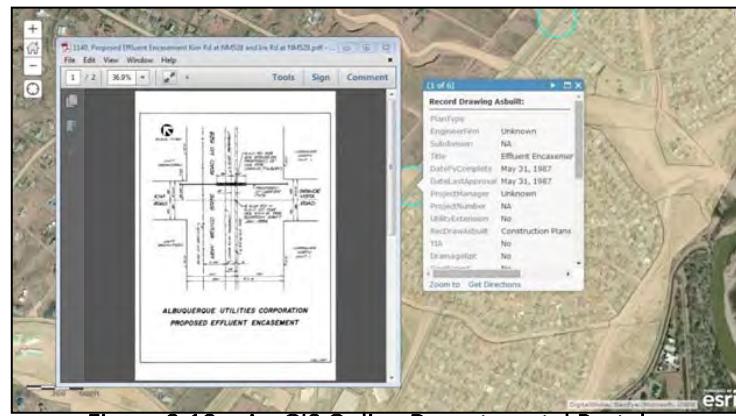
Figure 2.10 – ArcGIS Online Departmental Portal

- Compilation of Existing and Desired Software by Department to include description, number of users, software cost, and additional cost
- Business process analysis and matrix by department

Applications	Total Sum of Scoring
Intranet GIS Data Browser	272
ArcGIS for Desktop	180
Internet GIS Application	173
ArcGIS Online	144
Data Mining Application	125
311GIS	58
Mobile Data Browser	55
Esri's Story Map	44
Automated Vehicle Location (AVL)	42
GIS Based Work Order System	42
ArcGIS for Server Standard	34
Disaster Recovery and Damage Assessment Application	30
Spatial Analyst	21
ArcGIS for AutoCAD	21
ArcGIS Workflow Manager	19
3D Analyst	18

Applications	Num. Times Requested
Intranet GIS Data Browser	9
ArcGIS for Desktop	6
ArcGIS Online	6
Internet GIS Application	6
Data Mining Application	5
Automated Vehicle Location (AVL)	2
GIS Based Work Order System	2
Mobile Data Browser	2
311GIS	2
Esri's Story Map	2
3D Analyst	1
Spatial Analyst	1
Disaster Recovery and Damage Assessment Application	1
ArcGIS for Server Standard	1
ArcGIS for AutoCAD	1
ArcGIS Workflow Manager	1

Figure 2.11 – Application Priority Evaluations

- Summary of scoring across the enterprise and how many times the application was mentioned (See Figure 11)
- Software/application priority matrix considering the following: has the software already been purchased, potential cost savings, potential for improved efficiency and decision making, public safety impact, is it an enterprise tool, cost, and potential revenue generation.

Deliverables – GIS Software Solutions Document (Chapter 5 of the Overall Plan)

GIS Training and Education Model (Key Component of the Organizational Readiness Assessment) – A well thought out strategy detailing training and education is one of the Keys to GIS Success mentioned previously. Often organizations make the mistake of overlooking this key element or only focusing on training. Our team will take a detailed look at the training needs and also the education needs of the organization. This will include:

- Training recommendations based on level of GIS user from the GIS expert to the casual user
- Training alternatives – in-house or off-site
- Projected level of user by department with totals for each level (See Figure 12)
- GIS training matrix – classes recommended, site, trainer, course length in days/hours, year recommended, recommended participants, and cost
- GIS training classes by year
- Specialized training for GIS staff in ISD
- Table of classes and prerequisites
- Descriptions of each recommended course
- Continuing education recommendations
- Conference recommendations
- Communications/education plan – details how best to educate the organization
- Education recommendations for organizational leaders and elected officials
- Ways of education the public
- Regional opportunities
- How best to leverage a GIS User's Group
- Plan for interacting with the media
- Annual user satisfaction survey recommendations
- Use of social media

Deliverables – GIS Training and Education Document (Chapter 6 of the Overall Plan)

Figure 2.12 – Projected User by Department and Level of Software

Figure 2.13 – Training and Prerequisites

System Architectural Design (Key Component of the Technology Readiness Assessment) – As with any technology, there are a number of factors to successful enterprise-wide implementation and use. Applications must be fast and accessible. The underlying IT systems are critical to this success. GTG's team includes hardware, networking, and database specialists. We are experts of analyzing and establishing the proper environment for GIS. Key items that our team will analyze include:

- Hardware needed for various software packages
- Mobile GIS – our team has recently completed an in-depth study on the optimal hardware and software for mobile GIS for one of our clients. We tested numerous hardware/software options and will bring this wealth of knowledge to this project.
- Conceptual architecture design
- Analysis of existing GIS infrastructure
- Server analysis and recommendations
- Recommended Server Architecture to include production, staging, and public servers. Immediate and future.
- Desktop computer recommendations for end users
- Field data collection recommendations – Handheld GPS versus tablets/phones
- Peripheral recommendations – printers and plotters
- Network analysis and recommendations
- Database evaluation – optimization and considerations
- Database security and role recommendations
- Analysis of geospatial content management systems
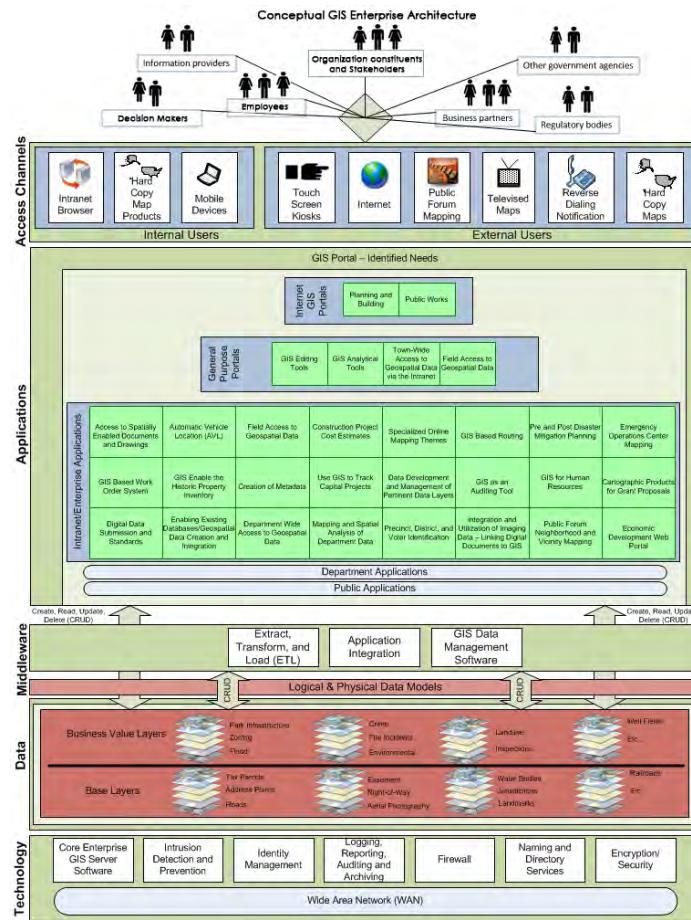
Figure 2.14 – Conceptual GIS Enterprise Wide Architecture

Deliverables – GIS System Architectural Design and Technology Readiness Assessment (Chapter 7 of the Overall Plan)
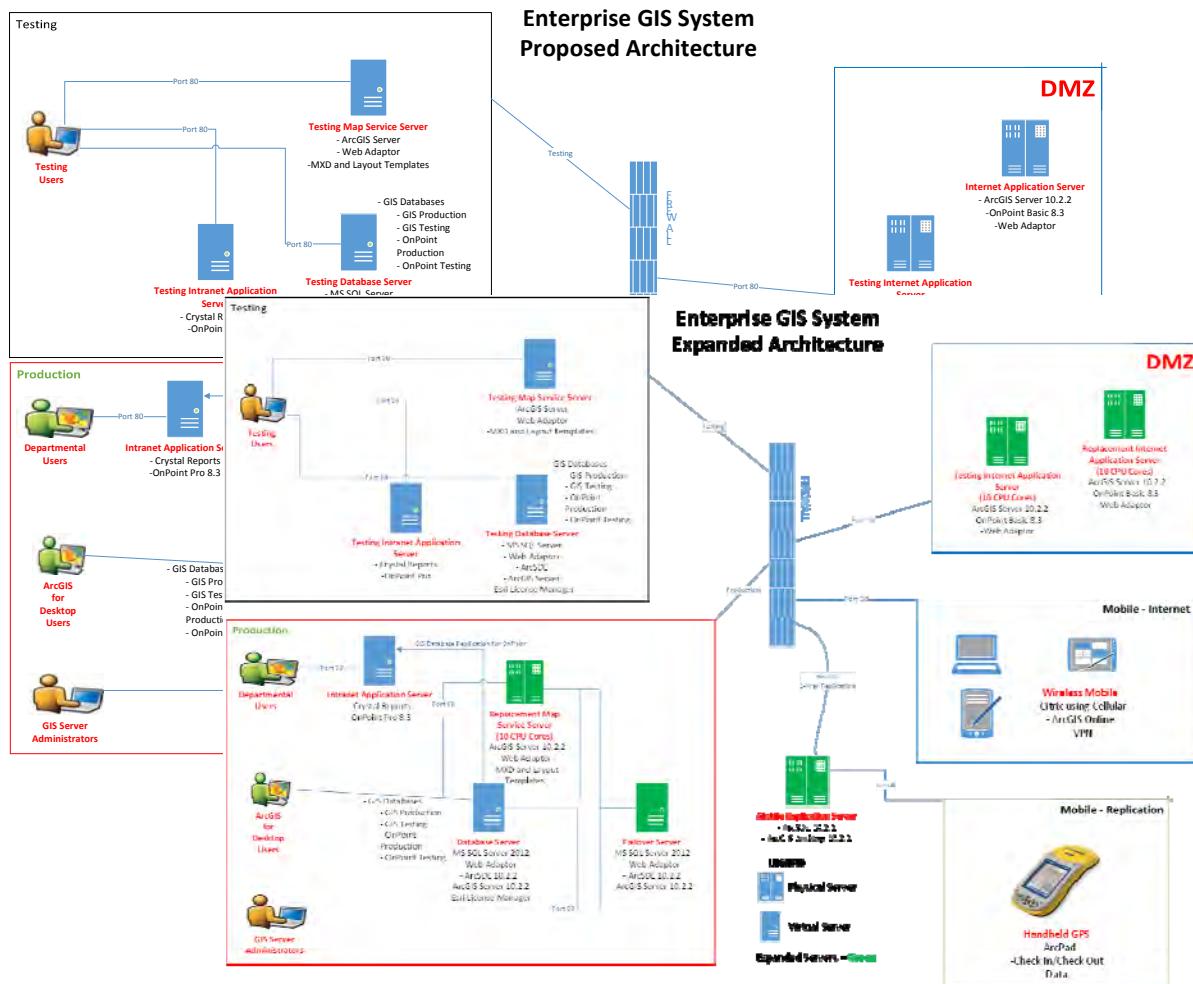
Figure 2.15 – Immediate and Future Architecture Recommendations

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PHASE III: Final Assessment and Implementation Plan Report

STEP 6 – Business Plan and Return on Investment (ROI) Analysis – GTG will develop a GIS Business Plan that will outline the project goals and objectives, the reasons they are believed to be attainable, and the plan for reaching those goals. It will contain background about the information gathered during the GIS Needs Assessment and Conceptual System Design.

The business plan will focus on identifying a strategy for improving County business processes using GIS technology. It will detail and document the following sixteen key issues required by the County, each of which fall into the following strategic planning categories:

Figure 2.16: Sixteen GIS Return on Investment Categories

The figure above illustrates sixteen examples of how GIS can offer a ROI. Our strategic plans will use case studies to demonstrate the benefits of GIS. The following Return-on-Investment (ROI) opportunities are typically used in the strategic planning process:

SAVING MONEY

GIS results in cost savings and cost avoidance. Immediate savings can be seen through better decisions and increased productivity. Cost avoidance becomes apparent as GIS helps organizations reduce and eliminate costs.

SAVING TIME

Having the information when you need and want it saves time, staff resources and money. Information can be made available to the public through a web site or touch screen kiosks in convenient locations, reducing demands on staff.

INCREASING PRODUCTIVITY

Access to accurate, current information instantly saves the staff from having to waste time searching for lost data or trying to correct inaccurate data. Accurate digital and electronic GIS mapping can be easily accessed by and shared among all departments.

IMPROVING EFFICIENCY

GIS helps organizations reduce and eliminate redundant steps in workflow processes. GIS programs help reduce workloads and facilitate new procedures, resulting in increased productivity and efficiency.

IMPROVING DATA ACCURACY

GIS creates maps from data; or paper maps can be digitized and translated into GIS. Maps can be created on any location, at any scale, and showing selected information to highlight specific characteristics. Precise GIS data enables users to generate accurate reports and produce quality maps instantly.

MAKING BETTER DECISIONS

GIS is a critical tool to query, analyze, and map data in decision support. GIS can, for example, be used to choose a location for a development that has minimal environmental impact, is located in a low risk area, and is close to a population center.

SAVING LIVES

In an emergency, when every second counts, GIS can lead rescuers quickly and accurately to the scene. The time saved in locating a citizen can be the difference between life and death.

AUTOMATING WORK-FLOW PROCEDURES

GIS helps automate tasks that expedite work-flow and enhance your ability to react efficiently during a crisis. GIS can automate routine analysis, map production, data creation and maintenance, reporting, and statistical analysis.

IMPROVING INFORMATION PROCESSING

Enterprise-wide GIS streamlines the flow of information throughout the organization, leading to better accuracy, better access, and increased efficiency in every aspect of the organization.

COMPLYING WITH STATE AND FEDERAL MANDATES

Digital inventories of water, sewer, and storm water infrastructure are becoming increasingly important in local governments. A complete GIS program includes asset management, inventory control, and depreciation based on accurate and timely data including age, size, and construction materials; this allows managers to predict and schedule repairs and replacement.

PROTECTING YOUR COMMUNITY

GIS helps public safety officials develop emergency plans and respond to disasters more effectively than ever before. GIS provides tools to monitor conditions, recognize threats, predict consequences, and respond effectively and efficiently to man-made or natural disasters. GIS can also help officials deliver information to citizens during an emergency, through emergency notification systems and the Internet.

IMPROVING COMMUNICATION, COORDINATION, AND COLLABORATION

Good communication is the key to running an effective organization. GIS helps staff and elected officials convey complex information in easy-to-understand formats.

PROVIDING DATA TO REGULATORS, DEVELOPERS, AND OTHERS

GIS makes it easy to deliver information for complex political and regulatory requirements. GIS allows regulators and developers to consider all pertinent data, which results in informed decisions and better results.

RESPONDING MORE QUICKLY TO CITIZEN REQUESTS

With GIS data at hand, staff members can easily respond to citizen requests for information. Maps are inherently easy to understand; they convey complex statistics and graphs clearly and easily.

IMPROVING CITIZEN ACCESS TO GOVERNMENT

Internet access to GIS information is the ultimate convenience for citizens. From their home or office citizens can access GIS information; staff is then free to help citizens with more complicated requests, resulting in increased customer satisfaction.

EFFECTIVELY MANAGING ASSETS AND RESOURCES

Effective management starts with analyzing, tracking, managing, allocating, and conserving assets. GIS technologies make production and delivery quick and efficient with maximum benefits.

STEP 7

Three-Year GIS Strategic Implementation Plan

(Plan of Action)

STEP 7 – Implementation Plan (Five Year Tactical Plan of Action) – GTG will develop an Implementation Plan and Five Year Tactical Plan of Action which will include the information developed during the assessment and recommended move forward strategy to the County's GIS Program. The final GIS Strategic Plan will include:

- An Executive Summary of recommended actions to be taken by the County
- Each recommended action will be documented and detailed
- Each recommended action will be prioritized and organized into a matrix of priority actions to be accomplished within the specified schedule
- GTG will provide a desired phased timetable for all recommended actions

- All recommended actions and dependencies will be detailed and described in the GIS Strategic Plan and the proposed schedule of events
- The GIS Strategic Plan will include an accurate estimate of the costs for each action.
- GTG will identify specific groups within the County that should perform each of the prioritized actions listed in the business plan
- A GIS Sustainability Analysis and Recommendations
- Ten year forecast of trends in GIS

Deliverables – Final Strategic Plan and Five Year Tactical Plan of Action (Chapter 8 of the Overall Plan). Final Presentation to include an executive summary, review of recommended strategy, and list of actions and concerns.

Summary – As identified in the *Seven Keys to GIS Success* this strategic plan is essential for future GIS success at San Mateo County. It is very important for the County to hire a consultant that focuses on GIS and has a background working in local government. GTG's strategic plans have been 100% successful in assisting local governments advance their GIS programs. Our team understands the unique needs of county government. We talk the language of each department. This allows us to quickly put department staff at ease and gain buy-in to the strategic planning process. We are confident that our team working with San Mateo County will guarantee future success.

The following sections answer specific items requested on page 18 of the RFP.

- **List or describe the type of resources and level of commitment you need from the County to fulfill the needs of the project.**
  - o Staff from each participating department will need to fill out the online questionnaire – time commitment 30 minutes
  - o Staff will be given the opportunity to attend the kickoff education seminar – time commitment 60-90 minutes
  - o Staff will need to participate in on-site interviews – time commitment varies between one hour to three hours depending on department
  - o At least one staff person will need to review their departments Needs Assessment – time commitment 1 to 2 hours
  - o Needs assessment on-site presentation – 1 to 2 hours
  - o Selected staff will need to review additional chapters – 2 to 3 hours per chapter. Mainly ITD, GIS staff, and/or project manager
  - o Weekly project updates sent to San Mateo County Project Manager – 10 minute review each week
  - o Monthly project plan update and conference call – San Mateo County Project Manager one hour monthly
  - o Final presentation – key staff 60 – 90 minutes
- **Physical space and equipment requirements**
  - o GTG will need appropriate rooms for presentations. Presentations will require a projector and a screen/wall on which to project.
  - o GTG will need conference rooms to conduct departmental interviews.
  - o No other county requirements
- **In the event of a problem, who should be contacted at GTG?** Curtis Hinton (President of GTG) will be the primary project manager. He can be reached through email at curt@geotg.com on the GTG office line at 919-759-9214 or via his cell phone at 919-344-2169. He is available daily from 5am to 9pm Pacific time 7 days a week.
- **In the event of problem identification, how will GTG address such a problem?** The following describes our detailed project management and problem resolution practices.

Project Management Plan

GTG will develop a Project Management Plan (PMP) that will illustrate a clear and concise comprehensive GIS strategic planning philosophy. The PMP will outline all phases of the project schedule, a communication plan, and all the resources and strategies necessary for the project to be successful. This proposal is the foundation of that project plan. Curt Hinton is the proposed joint project manager for this project. GTG's GIS technology planning philosophy is based on the fact GTG believes that there is a formula for success. It is based on the required components for success. GTG's project management philosophy is simple and effective. GTG commits to the project and guarantees complete satisfaction.

GTG has successfully developed project schedules, deliverables, and a project tracking and reporting methodology that has worked for many other clients. GTG will develop the following for the County:

1. **A Project Management Plan (PMP) with details of internal and external resources requirements**
   GTG will develop for the County, a PMP (see Appendix 2 for sample PMP) which will outline the tasks, schedule, deliverables/milestones, communication plan, and the associated resources (internal/external) that will be necessary for the project to be successful.

2. **Schedule and Project Tracking**
   GTG has developed a detailed 8 month project schedule for your review. It includes on-site interviews and the proposed schedule for each deliverable.

3. **Project Team Communications Plan**
   The following communications plan illustrates that GTG has a track record of tracking and reporting on GIS assessment projects. The monthly and weekly documentation will have the following information:
   a. Status of all tasks
   b. Planned work to be carried out
   c. Problems Encountered (if any)
   d. Steps taken to resolve problems
   e. Rectification for any schedule slippage

4. **Proposed Question and Resolution Tracking Procedures**
   The following describes GTG's specific plans to manage, and supervise all phases of this project. It includes the management team, communications strategy, progress reports, on-site and off-site services, milestones, and GTG's overall management strategy, including question and resolution tracking procedures.

   The Project Manager, Mr. Curt Hinton, is an experienced professional in the management and delivery of GIS products, conducting presentations, and promoting IT, GIS and GPS technology for local government. GTG is built on the basis of having created enduring relationships with many local government organizations across the United States. The County will benefit from the hands-on leadership approach for the entire lifespan of a project of this length and complexity. Mr. Hinton can be reached at any time to discuss any project issues or recommendations.

GTG enters into this as a true partnership with the County. GTG's expertise is apparent through presentations to elected officials, workshops, and publications, as well as a unique skill in presenting how GIS centric software and enterprise solutions can benefit government organizations. It is vital to work closely with all of the County departments to build consensus and agreement concerning the utilization of geo-spatial technology.

- **Other pertinent services that will reduce costs or enhance the revenue cycle for the County.** As described in the scope of services previously, GTG utilizes its 16 Return on Investment (ROI) categories to identify possible ROI for the County. This analysis is included in this project. Additionally, GTG has an exceptional track record of getting organizational buy-in for GIS. Our presentation skills and methodology has guaranteed funding for counties nation-wide.

Project Schedule

GTG proposes an eight month schedule to accomplish all tasks outlined in the scope of services. On the following page is the timeline anticipated for this project.

PROJECT TASKS	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8
	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4

TASK 1: PROJECT MANAGEMENT
- Schedule
- Project Management Plan (PMP)
- Project Tracking, Reporting, & Resolution Procedures
- Communications Plan

TASK 2: PROJECT KICKOFF SEMINAR
- Overview of GTG's Organization
- Quantifiable ROI Strategy
- GIS Governance Examples
- Importance of GIS for Municipalities
- 7 Keys to GIS Success and the Four Steps to Implementation
- Components of GIS

TASK 3: GIS NEEDS ASSESSMENT
- Departmental/User Group/Steering Committee Interviews (3 Staff On-site 5 Days)
- Assessment of the Current GIS Environment
- Evaluation of the Existing GIS Uses and Demands
- Current Integration Between GIS and other Software Solutions (WAM)
- Assessment and Summary of What the Users Require
- Detailed Report Defining Specific GIS Requirements of the County of San Mateo
- High Level Presentation and Detailed Report Documenting Future GIS Needs of the Users
- Comprehensive Needs Assessment Report

TASK 4: PRELIMINARY ASSESSMENT/EVALUATION
- SWOT Analysis (2 Staff On-site 3 Days)
- Preliminary Evaluation of GIS Integration Opportunities
- Document all Key GIS Issues, Constraints and Challenges
- Identify all GIS Opportunities
- Describe and Explain GIS Industry Trends, Directions, and the Evolving Nature of GIS
- Describe the Optimum GIS Architecture for Future GIS Growth and Usage
- Mobile GIS Implementation
- Identify Business Applications and Priority Choices
- Describe and Explain how Similar Sized Municipalities are Utilizing GIS
- Recommended GIS Strategic Initiatives Report

TASK 5: GIS VISION
- Enterprise GIS Vision for the County of San Mateo
- Enterprise GIS Goals and Objectives and Measures of Success
- Priorities for an Enterprise GIS
- Stakeholders Responsible for Decision-Making on Key GIS Issues
- Review of GIS Enterprise Architecture Model with Suggested Improvements
- Review of GIS User Group and Advisory Committee
- Possible External and Intergovernmental Partnerships
- Enterprise GIS Vision Report

TASK 6: ORGANIZATIONAL PLANNING/COMMUNICATION
- Recommended Organizational Administration Governance Model
- Recommended GIS Organizational Structure
- Recommended Optimum Staffing
- Recommended Roles for the GIS User Group and GIS Steering Committee
- Communication Strategy for all Stakeholders and Interested Parties or External Entities
- Organizational and Communication Recommendation Report
- Communication and Transition Plan

TASK 7: GIS SUSTAINABILITY STRATEGY
- Potential Sustainable Funding Sources
- Comprehensive Breakdown of all GIS Costs
- Maintenance and Operational Risks and Mitigation Recommendations
- Accurate Five-Year GIS Cost and Sustainability Strategic Report

TASK 8: GIS STRATEGIC PLAN
- Draft Corporate GIS Technology Plan
- Final Corporate GIS Technology Plan

TASK 9: FINAL PRESENTATION
- County of San Mateo Presentation
- Presentation Slides for the County of San Mateo

Figure 2.17– Example of Proposed Schedule

	Legend
(blue)	Project Work
(red circle)	Deliverable
(yellow)	On-site at San Mateo County

3

CLAIMS AND VIOLATIONS

"... a responsible, practical and insightful GIS Needs Assesment, system design and three-year implementation plan, GTG gave us four implementation options and exceeded all expectations. Outstanding!"

City of Pasadena, California

Claims and Violations

Geographic Technologies Group (GTG) has the ability to meet all of the requirements as stated in the RFP. Our team is committed to delivering all components of the project on time and within budget.

GTG does not have any pending bankruptcies, liens, stop payment notices, lawsuits, foreclosures, or any similar actions filed or resolved in the past seven years. Nor has GTG ever had a client terminate a contract for breach.

4

COST TO THE COUNTY

"GTG offers in-depth knowledge that is unparalleled in the industry. GIS implementation is a clear return on investment."

City of Sunnyvale, California

GEOGRAPHIC TECHNOLOGIES GROUP®

Cost to the County

Geographic Technologies Group (GTG) proposes a flat fee of $85,000 to complete all of the tasks described in the Request for Proposal. This lump sum is all inclusive of the Proposed Approach, which includes: Phase I, Phase II, and Phase III. Below is a list of the tasks to be accomplished along with additional fee requirements. GTG anticipates no ongoing fees as part of this project.

DESCRIPTION	AMOUNT
Phase I: GIS Needs Assessment	$45,165
Phase II: Conceptual Alternative Systems Design	$20,900
Phase III: Implementation Plan	$18,935
	$85,000

Key Staff	GTG Hourly Rate	Phase I – GIS Needs Assessment						Phase II – Conceptual Alternative Systems Design	Phase 3 – Enterprise GIS Implementation Plan			Total Hours
		Step 1	Step 2	Step 3		Step 4		Step 5	Step 6	Step 7		
David Holdstock	$110	11	16	40	35	16	4	60	20	16	24	242
Curt Hinton	$110	12	16	40	50	16	44	60	20	16	40	314
David Lyons	$90	6	0	40		15		30	0	15		106
Matthew McLamb	$75	4	0	40		25		40	0	15		124
Steve Hamlett	$100	0	0	15		0		20	0	15		50
Total Hours/Task		33	32	160	100	32	88	210	40	32	109	256 / 580
Total Cost of Work		$3,370	$3,520	$26,250		$12,025		$20,900	$4,400	$14,535		$85,000

Figure 4.1 – Proposed Cost to the County

*highlighted hours indicate onsite work

5

COOPERATIVE PURCHASING/ ADDITIONAL COST

" GTG's extensive knowledge of technology coupled with unmatched local government experience has made GIS implementation a very enjoyable and successful experience. "

City of West Sacramento, California

Cooperative Purchasing

Geographic Technologies Group (GTG) agrees that the resultant contract can be extended to other San Mateo County Cities and/or public agencies in the San Francisco Bay area upon their request. GTG understands that our response to this inquiry will not affect the selection decision unless other factors are deemed to be equal by the County.

Cost of Additional Services

Geographic Technologies Group (GTG) has assisted numerous organizations with development and implementation of GIS Strategic Plans. GTG understands that to successfully work in the GIS field, it is critical to have staff with relevant experience. Therefore, GTG has hired high-caliber GIS professionals who have been practicing GIS Coordinators, Analysts, and Programmers. This experience gives GTG intimate insight into how GIS functions within organizations and what must be accomplished to successfully implement GIS technology. Therefore, GTG has proposed a lump-sum fee for San Mateo County not to exceed $85,000. GTG does not foresee any additional costs for services, however, in the event that the County would like GTG to perform tasks and activities beyond the proposed Scope of Work the following fee schedule will apply:

Labor Rates / Rate Schedule (per hour)	
Service/Job Classification	Rate
Curt Hinton, Principal and Project Manager	$110
David Holdstock, Principal and Project Manager	$110
David Lyons, GIS Director, GIS Director	$90
Matthew McLamb, Senior GIS Project Manager	$75
Jessica Susich, GIS Analyst	$60
Jonathan Welker, GIS Analyst	$60
Steve Hamlett, VP of Software Engineering and IT	$100
Jason Cope, Senior IT Technical Analyst	$90
Julio Garrido, Installation and Integration Specialist	$75
Brad Butts, Technical Support Specialist	$65
Brittany Jones, Marketing Specialist	$40
Dawn Reim, Office Manager	$40

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REFERENCES

"I have been very impressed with the work completed in Phase 1 of the Town's GIS project. GTG is very responsive to our needs and flexible when we change priorities or ask for special requests. Communication has been excellent and we have not had any issues with them being based out of North Carolina (remote vendor versus local vendor)."

Town of Windsor, California

References

Since its inception in 1997, Geographic Technologies Group (GTG) has provided implementation services to local government organizations throughout the country. GTG has a unique strategic planning methodology and ability to explore new ways for local government departments to use GIS technology to improve efficiency, increase productivity, save time, and money. As the country's leading experts in GIS strategic planning, GTG delivers tailored solutions for towns, cities, and counties throughout the United States, and has outstanding references.
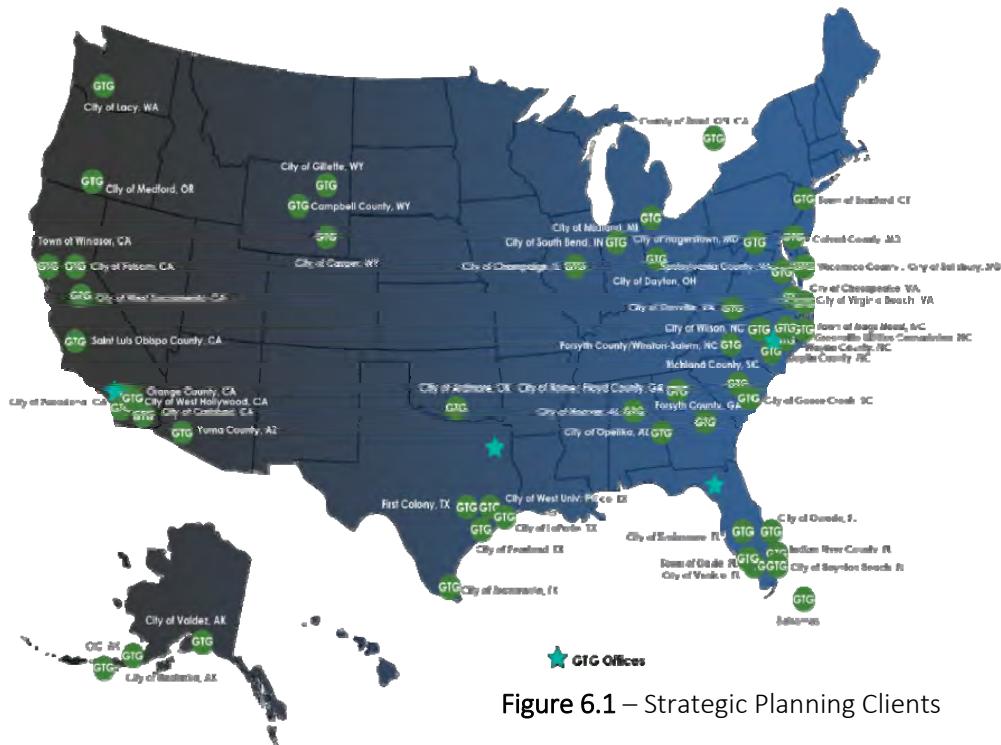
Figure 6.1 – Strategic Planning Clients

Additionally, our personnel are experts in similar comprehensive GIS needs assessment projects. We have worked with the majority of local government information technology (IT) systems on the market. We leverage our experience with these systems to move directly into solutions. Our team has conducted the research and already has this hands-on knowledge. This allows us to shorten our timelines while other companies require significantly more time and effort.

GTG often finds that our timelines and pricing are the most aggressive on the market. We understand the amount of work it takes to complete a project. We do not burden our clients with an inordinate amount of overhead. Our track record with clients is second to none.

The following is a list of clients most relevant to San Mateo County. The top six references are listed first. GTG has completed hundreds of successful GIS strategic planning projects, additional client references, and project descriptions are available upon request.

AGENCY	POPULATION	CONTACT	PHONE	EMAIL
San Luis Obispo County, CA	269,637	Guy Savage Susan Pittaway	805-781-5071 805-781-1175	gsavage@co.slo.ca.us spittaway@co.slo.ca.us
Geographic Technologies Group (GTG) conducted a GIS Needs Assessment, developed a Conceptual System Design, and created a multi-year phased GIS Implementation Plan. The project evaluated all the • Strategic, • Tactical, • Technical, • Logistical, and • Political Issues related to GIS implementation.				
Orange County, CA	3,010,232	Quazi Hashmi	714-834-7022	quazi.hasmi@ocgov.com
Geographic Technologies Group (GTG) conducted a GIS Needs Assessment, developed a Conceptual System Design, and created a multi-year phased GIS Implementation Plan. The project evaluated all the • Strategic, • Tactical, • Technical, • Logistical, and • Political Issues related to GIS implementation.				
Town of Windsor, CA	26,801	Carl Euphrat	707-838-1195	ceuphrat@Townofwindsor.com
Geographic Technologies Group (GTG) conducted a GIS Needs Assessment, developed a Conceptual System Design, and created a multi-year phased GIS Implementation Plan. The project evaluated all the • Strategic, • Tactical, • Technical, • Logistical, and • Political Issues related to GIS implementation.				
City of Pasadena, CA	477,892	Jonathan Robinson	626-744-6682	jrobinson@cityofpasadena.net
Geographic Technologies Group (GTG) conducted a GIS Needs Assessment, developed a Conceptual System Design, and created a multi-year phased GIS Implementation Plan. The project evaluated all the • Strategic, • Tactical, • Technical, • Logistical, and • Political Issues related to GIS implementation.				
City of West Hollywood, CA	34,781	Francisco Contreras	323-848-6874	fcontreras@weho.org
Geographic Technologies Group (GTG) conducted a GIS Needs Assessment, developed a Conceptual System Design, and created a multi-year phased GIS Implementation Plan. The project evaluated all the • Strategic, • Tactical, • Technical, • Logistical, and • Political Issues related to GIS implementation.				
City of West Sacramento, CA	48,744	Drew Gidlof	916-617-4515	Drew.gidlof@ci.west-sacramento.ca.us
Geographic Technologies Group (GTG) conducted a GIS Needs Assessment, developed a Conceptual System Design, and created a multi-year phased Enterprise GIS (EGIS) Implementation plan. The project evaluated all the • Strategic, • Tactical, • Technical, • Logistical, and • Political. Issues related to GIS implementation.				
Additional References Available Upon Request				
City of South Bend, IN	318,586	Shawn Delahanty	574-245-600	sdelahan@southbendin.gov
City of Guelph, Canada	121,668	Chris Sambol	519-822-1260	chris.sambol@guelph.ca
City of Eagan, MN	64,854	Tami Maddio	651-675-5212	tmaddio@cityofeagan.com
City of Hoover, AL	83,412	Robert Yeager	205-444-7595	yeagerr@ci.hoover.al.us
City of Goose Creek, SC	38,579	Chick Foster	843-824-2200 x270	cfoster@cityofgoosecreek.com
City of Winston-Salem, NC	234,349	Dennis Newman	336-747-7001	dennisn@ci.winston-salem.nc.us
Forsyth County, NC	358,137	Pete Rodda	336-703-2290	roddawa@forsyth.cc
Campbell County, WY	47,874	Cathy Raney	307-687-6297	clr23@ccgov.net

Town of Davie, FL	91,992	Irene DeGroot	954-797-2095	irene_degroot@davie-fl.gov
Calvert County, MD	88,737	Kathleen O'Brien	410-535-1600 x2307	obrienkm@co.cal.md.us
City of Rio Rancho, NM	91,956	BJ Gottlieb	505-896-8801	bjgottlieb@ci.rio-rancho.nm.us
City of Casper, WY	55,316	Terry Smith	307-235-8217	tsmith@cityofcasperwy.com
City of Chesapeake, VA	222,209	Peter Wallace	757-382-6659	pwallace@cityofchesapeake.net
City of Gillette, WY	29,087	Diane Williams	307-686-5218	diane@ci.gillette.wy.us
Yuma County, AZ	77,515	Brian Brady	928-373-4926	Brian.brady@ci.yuma.az.us
City of Titusville, FL	43,761	Rick Story	321-383-5787	Rick.story@titusville.com
City of Greenville, NC - Greenville Utilities	87,242	Sean Hawley	252-551-2050	hawleysn@guc.com
City of Salisbury, MD	30,343	Frank McKenzie	410-548-4860 x1661	fmckenzie@wicomicocounty.org
Wicomico County, MD	98,733	Frank McKenzie	410-548-4860 x1661	fmckenzie@wicomicocounty.org
City of Valdez, AK	3,976	Lisa Von Bargen	907-834-3401	lvonbargen@ci.valdez.ak.us
Town of Branford, CT	5,819	Peter Hugret	203-315-0617	phugret@branford-ct.gov
City of Hagerstown, MD	39,662	Scott Nicewarner	301-766-4071	snicewarner@hagerstownmd.org
City of Blue Springs, MO	52, 575	Gail Porter	816-228-0119	gporter@bluespringsgov.com
City of Boynton Beach, FL	66,714	Glendon Morgan	561-742-6086	morgang@bbfl.us
City of Unalaska, AK	4,376	Nancy Peterson	907-581-1260	npeterson@ci.unalaska.ak.us
City of Fort Pierce, FL	41,000	Marjorie Gaskin	772-460-2200	mgaskin@city-ftpierce.com
City of Goldsboro, NC	37,597	Jeff Cooke	919-580-4383	jcooke@ci.goldsboro.nc.us
City of Dayton, OH	141,527	Steve Hill	937-333-2514	Steve.hill@cityofdayton.org
City of Edina, MN	47,941	Jennifer Bennerotte	952-833-9520	JBennerotte@EdinaMN.gov

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" GTG gave us a fantastic, detailed, and comprehensive strategic GIS needs assessment and implementation plan. GTG was a great choice. "

City of Carlsbad, California

GEOGRAPHIC TECHNOLOGIES GROUP®

Statement of Compliance

Geographic Technologies Group (GTG) includes the following statements of compliance:

The County Non-Discrimination Policy

GTG understands and agrees that no person shall be denied any services provided pursuant to the Agreement with San Mateo County (except as limited by the scope of services) on the grounds of race, color, national origin, ancestry, age, disability (physical or mental), sex, sexual orientation, gender identity, marital or domestic partner status, religion, political beliefs or affiliation, familial or parental status (including pregnancy), medical condition (cancer-related), military service, or genetic information.

The County Equal Employment Opportunity Requirements

GTG shall ensure equal employment opportunity based on objective standards of recruitment, classification, selection, promotion, compensation, performance evaluation, and management relations for all employees under the Agreement with San Mateo County. GTG understands that our equal employment policies shall be made available to County upon request.

County Requirements Regarding Employee Benefits

GTG shall comply with the County's Equal Benefits Ordinance. With respect to the provision of benefits to its employees, GTG shall comply with Chapter 2.84 of the County Ordinance Code, which prohibits GTG from discriminating in the provision of employee benefits between an employee with a domestic partner and an employee with a spouse. GTG certifies the following statements are accurate:

> ☑ GTG complies with Chapter 2.84 by:
>> ☑ Offering the same benefits to its employees with spouses and its employees with domestic partners.

The County Jury Duty Ordinance

For purposes of San Mateo County's Jury Service Ordinance, GTG certifies that it has no employees who live in San Mateo County. To the extent that GTG hires any such employees during the term of its Agreement with San Mateo County, GTG shall adopt a policy that complies with Chapter 2.85 of the County's Ordinance Code.

The Hold Harmless Provision

GTG shall indemnify and save harmless San Mateo County and its officers, agents, employees, and servants from all claims, suits, or actions of every name, kind, and description resulting from the Agreement with San Mateo County, the performance of any work or services required of GTG under the Agreement with San Mateo County, or payments made pursuant to the Agreement with San Mateo County brought for, or on account of, any of the following: (A) injuries to or

death of any person, including GTG or its employees/officers/agents; (B) damage to any property of any kind whatsoever and to whomsoever belonging; (C) any sanctions, penalties, or claims of damages resulting from GTG's failure to comply, if applicable, with the requirements set forth in the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and all Federal regulations promulgated thereunder, as amended; or (D) any other loss or cost, including but not limited to that caused by the concurrent active or passive negligence of San Mateo County and/or its officers, agents, employees, or servants. However, GTG's duty to indemnify and save harmless under this Section shall not apply to injuries or damage for which San Mateo County has been found in a court of competent jurisdiction to be solely liable by reason of its own negligence or willful misconduct.

County Insurance Requirements

GTG understands that GTG shall not commence work or be required to commence work under the Agreement with San Mateo County unless and until all insurance required under this Section has been obtained and such insurance has been approved by County's Risk Management, and GTG shall use diligence to obtain such insurance and to obtain such approval. GTG shall furnish San Mateo County with certificates of insurance evidencing the required coverage, and there shall be a specific contractual liability endorsement extending GTG's coverage to include the contractual liability assumed by GTG pursuant to the Agreement with San Mateo County. GTG understands that these certificates shall specify or be endorsed to provide that thirty (30) days' notice must be given, in writing, to San Mateo County of any pending change in the limits of liability or of any cancellation or modification of the policy.

All Other Provisions of the Standard Contract

All services to be performed by GTG pursuant to the Agreement with San Mateo County shall be performed in accordance with all applicable Federal, State, County, and municipal laws, ordinances, and regulations. Further, GTG certifies that GTG and all of its employees will adhere to all other applicable provisions of the Agreement with San Mateo County.

Additionally, GTG agrees to have any disputes regarding the Agreement with San Mateo County venued in San Mateo County or the Northern District of California. Furthermore, GTG does not have any objections to any terms in San Mateo County's contract template.

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APPENDIX

" Innovative, hard-working, very knowledgeable, local government GIS experts. Our GIS success can be tied directly to the excellence of GTG's services. "

City of Rio Rancho, New Mexico

Curt Hinton GISP, President, JOINT PROJECT MANAGER

chinton@geotg.com | 919-759-9214

Mr. Curt Hinton, BA, MS, GISP established an award winning company, Geographic Technologies Group, Inc. (GTG) in 1997 with business partner Mr. David Holdstock. Mr. Hinton has planned, designed, and coordinated the implementation of GIS technology for over 800 government organizations. As President of GTG his duties include GIS Strategic Planning, client contact and satisfaction, and project technical supervisor.

Mr. Hinton has more than 22 years of GIS experience. As Wilson, North Carolina's GIS Coordinator, Hinton spearheaded the development and implementation of GIS for the City of Wilson. Mr. Hinton was successful in securing for the City of Wilson state, national, and international awards for the exemplary comprehensive use and city-wide implementation of GIS.

Mr. Hinton is a former Esri Certified Instructor and lead — GIS Implementation course instructor at the national Urban and Regional Information Systems Association (URISA) and GIS/LIS conference. Mr. Hinton presents his "Seven Keys to a Successful GIS" throughout the United States. Additionally, Mr. Hinton has presented the "10 Ways to Improve Public Safety with GIS" and "GIS Managers Workshop" at over ten national GIS conferences over the past three years.

- Public Safety Implementations for over 100 cities and counties
- Specializes in integrating GIS with existing information technology investments
- Former GIS Coordinator for the City of Wilson, North Carolina
- Won the URISA and American City and County Excellence in GIS Award
- Has hands-on experience implementing GIS for all city and county departments
- Was GIS Professional of the Year as voted by NC URISA
- Author and Presenter at Numerous GIS Conferences for:
- *"911 Checklist -10 Ways to Improve Your Public Safety with GIS"*
- Author of "Seven Keys to a Successful GIS"

UNIVERSITY OF NORTH CAROLINA Chapel Hill, North Carolina
Bachelor of Arts: Geography and Psychology
UNIVERSITY OF NORTH CAROLINA Chapel Hill, North Carolina
Master of Science: Geography

David Holdstock GISP, CEO, JOINT PROJECT MANAGER

dholdstock@geotg.com | 919-759-9214

Mr. David Holdstock, BA, MS, GISP established and incorporated Geographic Technologies Group, Inc. (GTG) in 1997 with offices in North Carolina, Texas, and Florida. Mr. Holdstock has planned, designed, and coordinated the implementation of GIS technology for over 200 government organizations. As CEO, his duties include GIS management, GIS planning, assessment, design, and implementation, client contact, and project technical supervisor.

Mr. Holdstock has more than 22 years of experience in the use and management of Geographic Information Systems (GIS) for various government organizations. Mr. Holdstock was the GIS Manager in Manhattan, New York for the world's leading transportation engineering company, Parsons, Brinckerhoff, Quade & Douglas. As PBQ&D's GIS Manager, Mr. Holdstock was responsible for the use and application of GIS technology in numerous engineering, transportation, planning and environmental projects.

Mr. Holdstock has also been the GIS/GPS Director at North Carolina State University Institute for Transportation Research and Education (ITRE). Mr. Holdstock established ITRE as one of the state's leading training and education centers for GIS and GPS. Mr. Holdstock managed and organized a very successful GIS training program and created a new GPS Trimble certified training center. Mr. Holdstock's role as Director allowed him to work with many government organizations and Public Works Department projects in the Carolinas on GIS/GPS projects.

- Owner and CEO of Geographic Technologies Group
- Twenty-two years of GIS experience
- Extensive experience in GIS for Public Works, Utilities and Engineering
- Worked on over 100 GIS Strategic Implementation Plans
- Former GIS Manager for world's leading Transportation Engineering Company – PPQD, NY
- Extensive publications and presentations on GIS for local government
- Certified GIS and GPS trainer
- GIS/GPS Program Director at NCSU - ITRE
- Project Manager on Eight GIS/Hazard Mitigation Plans

GREENWICH UNIVERSITY LONDON, U.K.

Bachelor of Science: Geography

NORTH CAROLINA STATE UNIVERSITY

Master of Science: Resource Management GIS Research Program

Matthew McLamb, GIS SOLUTIONS MANAGER

mmclamb@geotg.com | 919-759-9214

Mr. Matthew McLamb currently serves as the GIS Solutions Manager with Geographic Technologies Group. Mr. McLamb has been employed with GTG for seven years since completing his Computer Information Systems Bachelor of Science degree.

Mr. McLamb has extensive experience with street centerline data collection and verification as well as address points, driveways, and other critical data layers. Mr. McLamb was the technical project lead on the recent project for Granville County, North Carolina which included developing critical data layers for the 911 Center. Mr. McLamb has also worked closely with the City of Dunn, North Carolina to provide accurate data layers. Mr. McLamb has also been involved with the utility data layer creation for the Town of Windsor, CA.

STRATEGIC IMPLEMENTATION PLANS
- City of Goose Creek, SC
- Hot Springs Village, AR
- City of South Bend, IL
- City of West Hollywood, CA
- City of Pasadena, CA

UTILITY GIS DATA LAYER CREATION PROJECTS
- Town of Windsor, CA (Stormwater, Sewer, Water)

STREET DATA LAYER CREATION AND UPDATES
- Granville County, NC (Street centerline and address point project) – Technical Lead
- City of Dunn, NC (Street centerline and address point project) – Technical Lead
- Town of Windsor (Address point and street centerline review) – Technical Lead

MOUNT OLIVE COLLEGE, Mount Olive, North Carolina
Bachelor of Science: Computer Information Systems
NORTH CAROLINA STATE UNIVERSITY, Raleigh, North Carolina
MS: Geospatial Information Systems and Technology - Currently Enrolled

TECHNICAL EXPERIENCE
GIS Software: ArcGIS 9.x-10.x, ArcGIS Server 9.x-10.x, ArcSDE 9.x-10.x, ArcGIS Online, JavaScript, HTML, CSS

David Lyons, GISP

dlyons@geotg.com | 919-759-9214 | 888-757-4222

GIS Director at Geographic Technologies Group
Twenty-six years of GIS experience in the private and public sectors
Seven years of experience as a County GIS Coordinator
Extensive experience in GIS for Utilities, Public Works, and Engineering
Electric Systems Expert
Water and Sewer Systems Expert
Responsible for numerous implementations of ArcGIS Server, ArcSDE, SQL Server, and associated Geodatabase Design and Development
Has provided GIS Implementation Services and on-site Services to Numerous Clients
Has managed numerous office based and field based data development projects

SENOIR GIS MANAGER / SPECIALIST

Mr. David Lyons currently serves as the GIS Director with Geographic Technologies Group (GTG). Mr. Lyons has been employed with GTG for three years and has over 26 years of GIS experience. Mr. Lyons has extensive experience with geodatabase design and development, GIS governance, strategic planning, utilities GIS, spatial analysis, data conversion, Esri GIS products, AutoCAD, and implementing enterprise GIS for numerous organizations. Mr. Lyons has implemented the Local Government Information Model (LGIM) for several organizations in the past two years.

Mr. Lyons, leads the Consulting Group at GTG and is responsible for performing advanced technical work, project management, oversight of the consulting team, and ensuring client satisfaction with all GIS Consulting work performed by GTG. David's key experience includes:

- Extensive knowledge of the ArcGIS Desktop and ArcGIS for Server Products
- Responsible for numerous implementations of ArcGIS Server including ArcSDE and MS SQL Server
- Geodatabase Design and Development including the Local Government Information Model (LGIM) and MultiSpeak for Electric Utilities
- Conversion and/or integration of numerous data formats for GIS consumption including shapefiles, all geodatabase types, grids, terrains, ASCII files, TIFs, MrSID, JPEG, and many other formats.
- GPS field data collection and integration with GIS
- Development of CAD Standards to facilitate the migration of CAD data into GIS
- Project Management of over 100 Geospatial Projects

Mr. Lyons offers extensive on-call and as needed GIS services to:

- Town of Davie, Florida
- City of Hoover, Alabama
- City of Goose Creek, South Carolina
- City of Unalaska, Alaska
- City of Titusville, Florida
- City of Oviedo, Florida

As a former GIS Coordinator, provided outstanding service to internal and external customers, while managing all GIS activities for the county. Supervised 5 programmers/analysts and database administrators. Oversaw data automation, database maintenance, and cartography. Coordinated inter-governmental activities such as staff training and data sharing.

Jonathan Welker

jwelker@geotg.com | 919-759-9214 | 888-757-4222

Mr. Jonathan Welker currently serves as a GIS Analyst for Geographic Technologies Group. Mr. Welker has been employed with GTG since completing his Geography Master of Arts degree with a concentration in GIS. While attending school, he also provided GIS services as an intern for NASA's Carbon Monitoring System (CMS). Mr. Welker has quality experience performing address collection and verification as well as digitizing critical vector layers for town, city, and regional municipalities. Mr. Welker has provided technical support and cartographic services for Avoyelles Parish, Louisiana, served as the field technician for address point collection and verification for the City of Charleston, WV, and has created many of the pertinent geographic layers and data for the Town of Windsor's ArcGIS Online portal.

MUNICIPALITIES SERVED

- Town of Boone, NC
- Town of Windsor, CA
- City of Charleston, WV
- City of West Hollywood, CA
- Avoyelles Parish, LA

GIS DATA LAYER CREATION PROJECTS

- City of Edina, MN – Parks and Recreation inventory and GIS implementation
- Town of Windsor, CA (Stormwater, Sewer, Water, Water Service Areas)
- Translated CAD Utility Data to GIS format for New River Light and Power

Appalachian State University	Appalachian State University
Bachelor of Science: Geography and Community and Regional Planning	Master of Arts: Geography

	Jonathan Welker Qualifications	
1	Able to demonstrate experience in the creation/collection/conversion of GIS data.	General Understanding
2	Experience with ArcGIS Online maps, dashboards, applications.	General Understanding
3	Experience with local government GIS implementation, the Local Government Information Model, and able to demonstrate involvement with successful local government GIS implementation projects	General Understanding
4	Experience with working with local government data and be able to demonstrate involvement with successful local government GIS standardization projects.	General Understanding
5	Education and formal training	BS – Geography and Community and Regional Planning

Jessica Susich

jsusich@geotg.com | 919-759-9214 | 888-757-4222

Ms. Jessica Susich currently serves as a GIS Analyst for Geographic Technologies Group. She has ten years' experience with GIS, previously working for a consulting firm in Pennsylvania and a local government office in Idaho.

In her previous role at the Bench Sewer District in Boise, Idaho, she was the sole GIS person for the District and responsible for all aspects of the District's GIS including data/field collection, GPS features using Trimble equipment, data conversion, database maintenance, shapefile manipulation, attribute data, running ArcScripts, quality control and maintaining accurate metadata. The GIS data was analyzed to determine new project location and capacity, flow studies, and utility service.

Ms. Susich also worked closely with the City of Boise Public Works Department and the Ada County Highway District on utility projects. Her responsibilities included handling all permits, legal descriptions, annexations, subdivision plats, easements, as-builts and construction drawing reviews.

Prior to working for the sewer district, Ms. Susich worked as a GIS Specialist in the Telecommunications & Technology division for an engineering consulting company. Ms. Susich began working for Geographic Technologies Group in 2008. She is proficient in ArcGIS and ArcSDE and has provided GIS Services to the following GTG clients:

- Town of Davie, FL
- City of Hoover, AL

PENNSYLVANIA STATE UNIVERSITY
Bachelor of Science: Information Science and Technology

	Jessica Susich Qualifications	
1	Years of experience with all ESRI ArcGIS software and extensions in the performance of database logical and physical design and data loading.	8 years
2	Significant experience with the integration of legacy systems into the ESRI geodatabase format	Very Knowledgeable
3	Able to demonstrate experience in the creation/collection/conversion of GIS data.	General Understanding
4	Experience with ArcGIS Online maps, dashboards, applications.	General Understanding
5	Experience developing and implementing Intranet and Internet data browser applications.	General Understanding
6	Experience with local government GIS implementation, the Local Government Information Model, and able to demonstrate involvement with successful local government GIS implementation projects	Very Knowledgeable
7	Experience with working with local government data and be able to demonstrate involvement with successful local government GIS standardization projects.	Very Knowledgeable
8	Experience with general database practices and SQL server software database design and implementation. Experience relating external databases to GIS data.	Very Knowledgeable
9	Length and type of experience with the firm.	5 Years
10	Education and formal training	BS – Information Science and Technology

Steve Hamlett

shamlett@geotg.com | 919-759-9214 | 888-757-4222

With more than fifteen years of experience at GTG in software development, database management, and GIS, Mr. Hamlett spearheads GTG's efforts to remain on the cutting edge of the GIS software industry. He is currently leading GTG's GIS software initiatives which leverage Esri ArcGIS Server Advance Enterprise Edition software tools. Mr. Hamlett is an expert in the following:

- Total GIS Integration
- Software Development
- Enterprise GIS Planning
- Microsoft SQL
- Database administration
- Hardware and software support

Mr. Hamlett developed many of GTG's GIS software applications specifically geared toward use by local governments and used by thousands of employees at hundreds of municipalities across the country.

Because of his GIS software and IT expertise in advanced GIS software technologies, Mr. Hamlett is involved in all GIS Needs Assessment and GIS Implementation Plans requiring IT and GIS Architecture Evaluation and Systems Designs. His knowledge of leading edge technologies ensures that GTG's implementation of enterprise–level GIS solutions are truly state-of-the-art GIS solutions for local governments.

Danville Community College
Associates of Applied Science: General Engineering

	Steve Hamlett Qualifications	
1	Years of experience with all ESRI ArcGIS software and extensions in the performance of database logical and physical design and data loading.	15 years
2	Significant experience with the integration of legacy systems into the ESRI geodatabase format	Expert Level
3	Able to demonstrate experience in the creation/collection/conversion of GIS data.	Expert Level
4	Experience with ArcGIS Online maps, dashboards, applications.	General Understanding
5	Experience developing and implementing Intranet and Internet data browser applications.	Expert Level
6	Experience with local government GIS implementation, the Local Government Information Model, and able to demonstrate involvement with successful local government GIS implementation projects	Expert Level
7	Experience with working with local government data and be able to demonstrate involvement with successful local government GIS standardization projects.	Expert Level
8	Experience with general database practices and SQL server software database design and implementation. Experience relating external databases to GIS data.	Expert Level
9	Length and type of experience with the firm.	10 Years
10	Any related certifications	Microsoft Certifications

Jason Cope

jcope@geotg.com | 919-759-9214 | 888-757-4222

Mr. Jason Cope has worked in software application development for the past eight years. His past projects include the main design and development of local government software which received the Award for Innovation in Communication and Technology from the FCCMA for the City of Boynton Beach, FL. Mr. Cope has also led in the design and development of AVL, routing and Public Safety mobile mapping solutions at GTG. He is the lead developer for GTG's ArcGIS Server solutions, which are currently in use by several city and county organization's throughout the country.

Mr. Cope is currently overseeing the development of GTG's next generation software based on Microsoft's .NET framework and ESRI's Arc Engine and ArcGIS Server. He also oversees all public safety applications, web applications and projects dealing with land management. He also works closely with GTG's Software Technical Support Team in support of clients.

TECHNICAL EXPERIENCE

- Frameworks/Objects/Protocols: ASP.Net, ADO.NET, .NET 2.0, .NET 3.0, .NET 3.5, ArcObjects 9.x, ArcGIS Server Web ADF 9.x, ArcGIS Server Mobile ADF 9.x, SOAP, REST
- Programming Languages: C, C++, Java (J2ME), Java (J2SE), C#, VB 6, VB.Net, Flex
- Scripting Languages: Javascript, SQL
- Markup Languages: XML, HTML, CSS
- GIS Software: ArcGIS 9.x, ArcGIS Server 9.x, Network Analyst 9
- Development Software: Visual Studio 2005, Visual Studio 2008, CVS, SVN, Team Foundation Server
- Databases: MS SQL Server 2000, MS SQL Server 2005, MS SQL Server 2008, Oracle, MS Access

Appalachian State University
Bachelor of Science: Analytical Mathematics, Concentration in Education

ECPI Technical College
Computer Programming: National Vocational – Technical Honor Society

	Jason Cope, GISP Qualifications	
1	Years of experience with all ESRI ArcGIS software and extensions in the performance of database logical and physical design and data loading.	10 Years
2	Significant experience with the integration of legacy systems into the ESRI geodatabase format	Expert Level
3	Able to demonstrate experience in the creation/collection/conversion of GIS data.	Expert Level
4	Experience with ArcGIS Online maps, dashboards, applications.	General Understanding
5	Experience developing and implementing Intranet and Internet data browser applications.	Expert Level
6	Experience with local government GIS implementation, the Local Government Information Model, and able to demonstrate involvement with successful local government GIS implementation projects	Expert Level
7	Experience with working with local government data and be able to demonstrate involvement with successful local government GIS standardization projects.	Very Knowledgeable
8	Experience with general database practices and SQL server software database design and implementation. Experience relating external databases to GIS data.	Expert Level
9	Length and type of experience with the firm.	9 Years
10	Education and formal training	BS – Analytical Mathematics, Concentration in Education

Julio Garrido

jgarrido@geotg.com | 919-759-9214 | 888-757-4222

Mr. Julio Garrido currently serves as a Senior Software Specialist with Geographic Technologies Group. He has ten years of experience in Information Technology with the private sector and five years of experience as a Small Computer Unit Manager for the United States Air Force while stationed at Seymour Johnson AFB, NC as well as Osan Air Base, South Korea. He was also in aerial reconnaissance taking high definition photos of potential targets as well as damage assessment.

Upon leaving the Air Force, Mr. Garrido was employed by Electronic Data System (EDS) in Raleigh as a Computer Contractor for the United States Postal Service. At EDS, Mr. Garrido worked at the Field Operation Support Center assisting Postmasters and Postal employees throughout the country in resolving issues with their computer systems and network infrastructure. He then moved to a higher tier to work for the Email Support Team configuring, troubleshooting, and monitoring email servers for the many districts within the postal service.

Mr. Garrido is now our implementation, integration, and database expert and has extensive experience installing and configuring our current and legacy software suites. He is also our lead instructor and trainer for our new Vantage Points line of products.

His expertise in software installation and configuration has proven valuable in assisting the support team and is called upon to resolve the more difficult cases which arise from time to time.

North Carolina Wesleyan College
Bachelor of Science: Computer Information Systems

	Julio Garrido Qualifications	
1	Years of experience with all ESRI ArcGIS software and extensions in the performance of database logical and physical design and data loading.	5 Years
2	Significant experience with the integration of legacy systems into the ESRI geodatabase format	Expert Level
3	Able to demonstrate experience in the creation/collection/conversion of GIS data.	General Understanding
4	Experience with ArcGIS Online maps, dashboards, applications.	General Understanding
5	Experience developing and implementing Intranet and Internet data browser applications.	General Understanding
6	Experience with local government GIS implementation, the Local Government Information Model, and able to demonstrate involvement with successful local government GIS implementation projects	General Understanding
7	Experience with working with utility data and be able to demonstrate involvement with successful electric utility GIS standardization projects.	General Understanding
8	Experience with general database practices and SQL server software database design and implementation. Experience relating external databases to GIS data.	Expert Level
9	Length and type of experience with the firm.	6 Years
10	Education and formal training	BS – Computer Information Systems

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SAMPLE PROJECT PLAN

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Ver	Issue Date	Author(s)	Description of Change
1	07/11/14	MM	First draft for review and comment

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qqContact Information

Name	Email	Telephone
City of Guelph	**1 Carden St., Guelph, Ontario, CA N1H 3A1**	
Project Management		
Proj Mgr **Chris Sambol**	Chris.Sambol@guelph.ca	519-822-1260 x2467
Project Team		
Corp. App. Analyst **Mike Bartholomew**	Michael.Bartholomew@guelph.ca	519-822-1260 X2581
Sasha Tousignant	Sasha.Tousignant@guelph.ca;	
Geographic Technologies Group	**1202 Parkway Drive, Goldsboro, NC 27534**	
Project Management		
Proj Mgr **Curt Hinton**	CHinton@GeoTG.com	919.344.2169 C
Proj Mgr **David Holdstock**	david@geotg.com	919.222.1421 C
Project Team		
GIS Solutions **Matthew McLamb**	mmclamb@geotg.com	919.759.9214 ext. 171
GIS SME **David Lyons**	DLyons@GeoTG.com	919.738-2102 C

	Name	Email	Telephone
Software Solutions	**Steve Hamlett**	SHamlett@GeoTG.com	919.222.1503 C
Finance	**Dawn Reim**	DReim@GeoTG.com	919.759.9214

Communications Plan

Bi-Weekly Project Meetings

The Project Team will hold regular Project Meetings bi-weekly each **Wednesday at 10:00am ET**

Curt Hinton (GTG) and Matthew McLamb (GTG) will lead each meeting and topics will be limited to technical and logistical issues related to project progress. Chris Sambol (City) and any City or GTG technical staff or management with agenda items or new / outstanding issues shall attend. Issues log and action items will be the primary outputs from the bi-weekly Technical Meetings.

Weekly Progress Reports

Each Friday, Matthew McLamb (GTG) will prepare a weekly status report, enumerating the project work efforts of the week. Included will be a status of each task and deliverable, the results of the bi-weekly Project Meeting, new / completed Action Items, and new / closed technical Issues from the Issues Log. The weekly report will be distributed to the GTG and City Project Managers, and other stakeholders (TBD).

Monthly Project Reports

On the **last weekday of each month**, Matthew McLamb (GTG) will prepare a Monthly Status Report, detailing all progress made over the previous month. This report will describe project successes, challenges and road blocks; provide updates to the issues log and action items; and deliver an overview on the status of the project's tasks, deliverables, financials, and schedule.

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Issues Log

The Issues Log will be maintained by GTG, with a mirror copy available at the City. The issues log will list any issues and provide a mutually agreed solution or clarification. If an issue's resolution impacts the project's scope, quality, schedule, or financial plans, issue resolution must be approved by GTG and City management; otherwise the team may agree to and close non-impact issues. Agreed and closed issues become part of the project plan and will serve as guideposts for any similar technical issue.

Sample Issues Log:

ID	Urgency	Issue	Raised By	Proposed Resolution	Date Raised	Resolution	Date Resolved	Age	Status
I-001	MED	Nursing Homes	GTG	Traditional skilled nursing homes and rehabilitation facilities will be addressed as a single unit. The noted exception are individually addressed, condominium- or apartment -style assisted living and retirement facilities, which will have handled as there are individually addressable units with private entrances.	09/27/11	Accepted as proposed.	09/27/11	0	Closed
I-002	MED	Hospitals	GTG	Hospitals will be treated as a single address. Any clinics or offices with marked, exterior entrances will be treated as separate addresses in the same bldg. Each building in a hospital campus will likely have unique addresses.	09/27/11	Accepted as proposed.	09/27/11	0	Closed
I-003	MED	Hotels	GTG	Hotels and motels will be treated as a single address. If a hotel or motel has separately addressed buildings, each building will be treated as a single address.	09/27/11	Accepted as proposed.	09/27/11	0	Closed
I-004	MED	New building points	SCo	Once the building points are provided, GTG will integrate new building points into the address assessment process with the start of the next unprocessed working unit.	10/04/11	Accepted as proposed.	11/18/11	45	Closed
I-005	MED	Problem addresses	SCo	GTG's internal 'notes' field will be passed to the County as part of the deliverable. The notes field will be used to communicate problems with addresses identified in the field and will aid the County's data acceptance effort, provide items for this issues log. The data model will be updated to reflect this change.	10/11/11	Accepted as proposed.	10/11/11	0	Closed
I-006	MED	Storage units	GTG	The address for a storage unit office, if any, will be captured. Individual units will not be captured. If there are more than 1 addressed bldg., each bldg. will be captured; if not addressed, they will be marked for deletion.	10/24/11	Accepted as proposed.	11/01/11	8	Closed
I-007	MED	Parks and Recreation Facilities	SCo	Considering outdoor parks and recreation areas, specific facilities such as athletic fields, courts, stands, shelters, performance areas, restrooms, concession stands, pavilions or picnic areas, will not be collected unless visibly addressed. Any bldg. points not visually addressed will be flagged for deletion.	10/18/11	Accepted as proposed.	11/01/11	14	Closed
I-008	HI	Dormatories and Student Housing	GTG	Due to the transient nature of the population, combined with centralized housing services (postal, dining, security, laundry, controlled entry, common rooms), GTG recommends dormitories and student housing not be considered individual addressing units and each dormitory will be captured as a single address.	10/28/11	Accepted as proposed.	11/01/11	4	Closed

Meeting Guidelines

Meeting Agenda - The Meeting Chair will prepare and distribute a Meeting Agenda to all attendees, invited guests (SME's) and stakeholders (TBD) in

advance of a meeting. The Agenda should identify each presenter for each agenda topic along with a suggested time limit for that topic. The first item in the agenda should be to introduce any new stakeholders, followed by a review of any open Action Items or Outstanding Issues. Agenda items may be proposed by any stakeholder.

Meeting Minutes – The Meeting Chair will prepare and distribute Meeting Minutes to all attendees and stakeholders (TBD) within 2 business days following the meeting. For each item on the agenda, the minutes should include a review of each topic, summary of discussions, and decisions made. Outstanding and new action items detailing the responsible party, task assigned and due date will be published in the Meeting Minutes. Unresolved Issues must be documented. Changes to the Issues Log (new, resolved, closed) will be published in the Meeting Minutes. The Meeting Minutes will list the dates, times and locations (or method) of any upcoming regularly scheduled or ad hoc meeting.

Action Items – Outstanding Action Items are recorded in each meeting agenda and Outstanding and New Action Items will be listed in the following Meeting Minutes. Action items will include the action item, the owner / responsible party of the action item, and the due date. Each Action Item will be assigned a unique ID and Title. Meetings will start with a review of the status of outstanding Action Items and end with a review of any new Action Items resulting from the meeting.

Outstanding Issues - The Issue Log is a tool used to record deferred meeting agenda items. Unresolved Items merit further discussion at a later time, require further research or completed Action Items, or should be addressed through different forum. An Unresolved Issue should identify the owner of an item as that person who will be responsible for ensuring follow-up, usually the person who initially brought up the item. All Unresolved Items are to be included in Meeting Agenda and Minutes until closed through resolution or abandonment.

Chair Person – The Meeting Chair Person is responsible for distributing the meeting agenda, facilitating the meeting and distributing the meeting minutes. The Chair Person will ensure that the meeting starts and ends on time and that all presenters stay on point and adhere to their allocated time frames.

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Scribe - A Scribe may be appointed by the Meeting Chair to document the meeting's attendees, start and end times, topics discussed, decisions made, and Action Items assigned. The Scribe will provide their notes to the Meeting Chair at the end of the meeting which will be used by the Meeting Chair to create the Meeting Minutes.

Successful Meeting Etiquette

- Attend all meetings as required. Be on time. Do not interrupt a meeting in progress.

- Silence pagers and cell phones. Take urgent calls away from the meeting area.

- Agree on a time limit rule for disagreements.

- Consider all participants as equals regardless of title. All contributions and opinions have value.

- Allow speakers to complete their thoughts. Listen objectively and respectfully.

- Limit one agenda issue at a time. Avoid off-topic and sidebar discussions.

- Stick to facts. Give specific examples. Avoid discussing personalities and emotional arguments.

- Criticize a process or product, not the people.

Time Zones - GTG staff are generally located in the Eastern Time zone and City staff are located in the Eastern Time Zone. Whenever a time is referenced, it shall be assumed to be Eastern Time unless otherwise noted.

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Project Task Summary

Task Name	Duration	Start	Finish	Status
Task 1 – Conduct Mobile GIS Pilot Project Workshops	**5 Days**	**6/23/2014**	**06/27/2014**	**Complete**
Prepare Agendas for Meetings				Complete
On-site Technical Workshops	3 days	6/23/2014	6/25/2014	Complete
Prepare Minutes from Workshops	2 days	6/26/2014	6/27/2014	Complete
Task 2 – Create the Mobile GIS Pilot Project Plan	**15 Days**	**6/23/14**	**7/14/14**	**In Progress**
Select Users and Sites	1 day	6/23/2014	7/7/2014	In Progress
POC Users and Site Selection	1 day	7/7/2014	7/7/2014	In Progress
Develop Training Material to Prepare Users	1 day	7/8/2014	7/10/2014	In Progress
Prepare/Train Users and Sites	2 Days	7/11/2014	7/14/2014	In Progress
Task 3 – Conduct Mobile/Field GIS Pilot Project	**36 Days**	**7/15/14**	**9/3/14**	**Not Begun**
Proof-of-Concept Testing	20 Days	7/15/14	8/11/14	Not Begun
Pilot Project Support and Monitoring	25 Days	7/15/14	8/18/14	Not Begun
Obtain Feedback and Evaluate Results	5 Days	8/19/14	8/25/14	Not Begun
POC Results Report	1 Day	8/25/14	8/25/14	Not Begun

Task Name	Duration	Start	Finish	Status
POC Presentation	1 Day	8/25/14	8/26/14	Not Begun
Accept or Revise Presentation	2 Days	8/25/14	8/26/14	Not Begun
POC Assessments and Recommendations	1 Day	8/26/14	8/26/14	Not Begun
Revise POC and Re-test (if needed)	5 Days	8/27/14	9/3/14	Not Begun
Re-tested POC Evaluation and Assessment	1 Day	9/3/14	9/3/14	Not Begun
Task 4 – Lessons Learned	**6 days**	**9/4/14**	**9/11/14**	**Not Begun**
Develop Lessons Learned Report	5 Days	9/4/14	9/10/14	Not Begun
Lessons Learned Report	1 Day	9/10/14	9/10/14	Not Begun
Update GIS Technology Plan	1 Day	9/11/14	9/11/14	Not Begun
Task 5 – Moving Forward	**29 days**	**9/12/14**	**10/23/14**	**Not Begun**
Compile Field Data Collection Recommendations Report	10 days	9/12/14	9/25/14	Not Begun
Field Data Collection Recommendations Report	1 day	9/25/14	9/25/14	Not Begun
Production Deployment	8 days	9/26/14	10/7/14	Not Begun
Compile Full-Scale Mobile/Field Data Collection Project Procedures	8 days	9/26/14	10/7/14	Not Begun
Full-Scale Mobile/Field Data Collection Project Procedures	1 day	10/7/14	10/7/14	Not Begun

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Task Name	Duration	Start	Finish	Status
Compile Detailed Technical Implementation Plan	5 days	10/8/14	10/15/14	Not Begun
Detailed Technical Implementation Plan	5 days	10/16/14	10/22/14	Not Begun
On-site Pilot Project Findings Workshop	1 day	10/23/14	10/23/14	Not Begun

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Financial Summary

Task Name	Budget	Invoice Planned / Actual
Task 1 – Conduct Mobile GIS Pilot Project Workshops		$1,500 / $1,500
Prepare Agendas for Meetings		
On-site Technical Workshops		
Prepare Minutes from Workshops		
Task 2 – Create the Mobile GIS Pilot Project Plan		$8,200 / $6,700
Overview of GTG's Organization		
Quantifiable ROI Strategy		
GIS Governance Examples		
Importance of GIS Municipalities		
Task 3 – Conduct Mobile/Field GIS Pilot Project		$18,600
Proof-of-Concept Testing		
Pilot Project Support and Monitoring		
Obtain Feedback and Evaluate Results		
POC Results Report		
POC Presentation		

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Task Name	Budget	Invoice Planned / Actual
Accept or Revise Presentation		
POC Assessments and Recommendations		
Revise POC and Re-test (if needed)		
Re-tested POC Evaluation and Assessment		
Task 4 – Lessons Learned	**$1,700**	
Develop Lessons Learned Report		
Lessons Learned Report		
Update GIS Technology Plan		
Task 5 – Moving Forward	**$9,800.00**	
Compile Field Data Collection Recommendations Report		
Field Data Collection Recommendations Report		
Production Deployment		
Compile Full-Scale Mobile/Field Data Collection Project Procedures		
Full-Scale Mobile/Field Data Collection Project Procedures		
Compile Detailed Technical Implementation Plan		

Task Name	Budget	Invoice Planned / Actual
Detailed Technical Implementation Plan		
On-site Pilot Project Findings Workshop		
Subtotal	$39,800 / $8,200	
HST (13%)	$5,174 / $1,066	
Total Contract Price	**$44,974 / $9,266**	

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SAMPLE PROJECT PLAN

Schedule Summary

Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Task 1 – Conduct Mobile Pilot Project Workshops																								
Prepare Agendas for Meetings		■																						
On-site Technical Workshops							■																	
Prepare Minutes from Workshops							■																	
Task 2 – Create the Mobile GIS Pilot Project Plan																								
Select Users and Sites							■																	
POC Users and Site Selection										■														

A.24

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Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Develop Training Material to Prepare Users										■														
Prepare/Train Users and Sites										■														
Task 3 – Conduct Mobile/Field GIS Pilot Project																								
Proof-of-Concept Testing											■	■	■	■										
Pilot Project Support and Monitoring											■	■	■	■										
Obtain Feedback and Evaluate Results															■									
POC Results Report																■								

A.25

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Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
POC Presentation																■								
Accept or Revise Presentation																■								
POC Assessments and Recommendations																■								
Revise POC and Re-test (if needed)																■	■							
Re-tested POC Evaluation and Assessment																	■							
Task 4 – Lessons Learned																								
Develop Lessons Learned Report																	■	■						

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Project Tasks	May '14 Week 1	2	3	4	June '14 Week 1	2	3	4	July '14 Week 1	2	3	4	Aug. '14 Week 1	2	3	4	Sept. '14 Week 1	2	3	4	Oct. '14 Week 1	2	3	4
Lessons Learned Report																		■						
Update GIS Technology Plan																		■						
Task 5 – Moving Forward																								
Compile Field Data Collection Recommendations Report																		■	■					
Field Data Collection Recommendations Report																		■						
Production Deployment																			■	■	■			
Compile Full-Scale Mobile/Field Data																			■	■	■			

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Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Collection Project Procedures																								
Full-Scale Mobile/Field Data Collection Project Procedures																					■			
Compile Detailed Technical Implementation Plan																					■	■		
Detailed Technical Implementation Plan																							■	■
On-site Pilot Project Findings Workshop																							■	

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SAMPLE PROJECT PLAN

Detailed Project Deliverables List

Task 1 – Conduct Mobile GIS Pilot Project Workshops

Task 1 is dedicated as a project kickoff and data gathering task. GTG will be on-site at the City of Guelph meeting with each of the defined groups to review the project's goals and objectives. GTG will also be interviewing each group to determine the needs they have in regards to Mobile GIS.

Task Lead: Matthew McLamb and Chris Sambol

Schedule

Duration: 37 days Start: 5/12/14   End: 7/3/14   Status: Complete

Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Task 1 – Conduct Mobile Pilot Project Workshops																								
Prepare Agendas for Meetings		■																						
On-site Technical Workshops							■																	
Prepare Minutes from Workshops							■																	

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Deliverables

Deliverable	Inputs
Task 1 – Conduct Mobile GIS Pilot Project Workshops	
Schedule	Used the original proposal and augmented as per kickoff discussions
Project Management Plan (PMP)	Delivered to Chris Sambol on 7/11/14
Progress Reports (weekly & monthly)	Matthew McLamb has added these to the calendar
Progress Meetings	Bi-weekly

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Task 2 – Create Mobile/Field GIS Pilot Project Plan

GTG will create the mobile/field GIS pilot project plan which will guide this project. This will include the selected users and sites as well as the intended proof-of-concepts for the project. This will be a living document and will be updated as the project progresses and needs change based on field testing.

Task Lead: Matthew McLamb

Schedule

Duration: 15 days   Start: 6/23/14   End: 7/14/14   Status: In Progress

Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Task 2 – Create the Mobile GIS Pilot Project Plan																								
Select Users and Sites							■																	
POC Users and Site Selection									■															
Develop Training Material to Prepare Users										■														
Prepare/Train Users and Sites										■														

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Deliverables

Deliverable	Inputs
Task 2 – Create Mobile/Field GIS Pilot Project Plan	
Users and Sites	Delivered to Chris on 7/11/14
Proof-of-Concepts	Delivered to Chris on 7/11/14

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SAMPLE PROJECT PLAN

Task 3 – Conduct Mobile/Field GIS Pilot Project

During this task, the POC's identified in Task 2 will be tested in the field by City staff as well as staff from GTG. GTG will be on-site for the first week of the testing phase in which equipment will be setup and configured for each of the POC's identified. GTG will conduct a training workshop with all of the groups in which each POC will be reviewed and the equipment examined more closely. GTG will provide POC support and monitoring for the duration of this task.

Once the initial testing phase is complete, GTG will obtain feedback and results from the users. GTG will then create a POC results report based on these findings and will conduct a POC presentation. The POC's will then be accepted or revised based on feedback and some POC's may be re-tested or discarded all together. The re-test evaluation and assessment of POC's (if needed) will then be delivered.

Task Leads: Matthew McLamb and Chris Sambol

Schedule

Duration: 36 days Start: 7/15/14 End: 9/3/14   Status: Not Begun

Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Task 3 – Conduct Mobile/Field GIS Pilot Project																								
Proof-of-Concept Testing										■	■	■	■											
Pilot Project Support and Monitoring										■	■	■	■											
Obtain Feedback and Evaluate Results													■											

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Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
POC Results Report																■								
POC Presentation																■								
Accept or Revise Presentation																■								
POC Assessments and Recommendations																■								
Revise POC and Re-test (if needed)																■	■							
Re-tested POC Evaluation and Assessment																	■							

Deliverables

Deliverable	Inputs
TASK 3 – Conduct Mobile/Field GIS Pilot Project	
Pilot Project Technical Workshop	
POC Feedback and Results Report	
POC Presentation	
Revised POC Evaluation and Assessment	

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Task 4 – Lessons Learned

Based on the final results from Task 3, GTG will develop a lessons learned report to outline all of the findings including key issues identified in the field.

Task Leads: Matthew McLamb

Schedule

Duration: 6 days   Start: 9/4/14   End: 9/11/14   Status: Not Begun

Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Task 4 – Lessons Learned																								
Develop Lessons Learned Report																	■	■						
Lessons Learned Report																			■					
Update GIS Technology Plan																			■					

Deliverables

Deliverable	Inputs
Task 4 – Lessons Learned	
Lessons Learned Report	

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Task 5 – Moving Forward

During Task 5, GTG will compile all of the information gathered into one final report. This final report will be comprised of multiple sub-reports as follows:

- Field Data Collection Recommendations Report
- Full-scale Mobile/Field Data Collection Project Procedures
- Detailed Technical Implementation Plan

The last task within Task 5 will include a full presentation of all of the findings to all stakeholders. This will be the final Pilot Project Findings Workshop.

Task Leads: Matthew McLamb and Chris Sambol

Schedule

Duration: 29 days   Start: 9/12/14   End: 10/23/14   Status: Not Begun

Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Task 5 – Moving Forward																								
Compile Field Data Collection Recommendations Report																		■	■					
Field Data Collection Recommendations Report																			■					
Production Deployment																			■	■	■			

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Project Tasks	May '14 Week				June '14 Week				July '14 Week				Aug. '14 Week				Sept. '14 Week				Oct. '14 Week			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Compile Full-Scale Mobile/Field Data Collection Project Procedures																			■	■	■			
Full-Scale Mobile/Field Data Collection Project Procedures																					■			
Compile Detailed Technical Implementation Plan																					■	■		
Detailed Technical Implementation Plan																						■	■	
On-site Pilot Project Findings Workshop																							■	

Deliverables

Deliverable	Inputs
Task 5 – GIS Vision	
Field Data Collection Recommendations Report	
Full-Scale Mobile/Field Data Collection Project Procedures	
Detailed Technical Implementation Plan	

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Deliverable	Inputs
On-site Pilot Project Findings Workshop	

Communications Log

Date		Stakeholder(s)	Topic(s)
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Date		Stakeholder(s)	Topic(s)
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SAMPLE

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How to Increase efficiency and effectiveness using GIS

What's NEW?

Geographic Technologies Group (GTG) specializes in how to implement GIS technology to improve Local Government operations. Investing in GIS technology can often be complex and cumbersome without a clear and concise "value proposition" that details the opportunities for each Department and the Government Enterprise to improve efficiency and effectiveness. GTG can help leverage the essential "performance factors" and then quantify the benefits of GIS:

THE EFFICIENCY OF GIS TECHNOLOGY
- Information processing
- Saving time
- Increased productivity
- Mobile Computing
- Automating workflows
- Improve citizen Access
- Provide data to regulators and developers

THE EFFECTIVENESS OF GIS TECHNOLOGY
- Protect the community
- Complying with State and Federal mandates
- Improved communication
- Save money
- Make better quality decisions
- Save lives
- Respond more quickly to citizen requests
- Management of assets
- Improve data accuracy
- Public Outreach

Identifying the quantifiable and measurable benefits of GIS to a local government organization is critical to its success. GTG understands Local Government. GTG has accomplished overwhelming GIS implementation success, winning international awards for exemplary use of GIS in Local government, Mobile GIS software, and Local Government implementation support.

A recent market survey identified that about 90% of Local Government agencies are not fully utilizing the power of the GIS tools at their disposal. Making the best use of available GIS technology is key to maximizing efficiency and effectiveness, thereby gaining the most return on investment. Delivering services quickly while leveraging all available data is mission critical – helping save time, lives, and money.

A **Local Government GIS Health Check** is the ideal opportunity to identify where efficiencies can be found and the technology better used. Geographic Technologies Group offers 2-day on-site visits to assess and analyze all existing GIS operational conditions and determine the best path for your organization.
- Utilization Analysis
- GIS Architecture and Infrastructure
- Data and Databases
- GIS Governance and Maintenance Workflows
- Identify: Opportunities To Reduce Avoidable Problems
- GIS Usage, Data Access and Staffing
- Return on Investment (ROI) Analysis
- Short-Term GIS Goals and Objectives to Improve Operations

FOR MORE INFORMATION

call 888.757.4222, email sales@geotg.com, or simply reply to this email.

E-bulletin

THE IMPORTANCE OF DATA AUTOMATION FOR LOCAL GOVERNMENT

What's NEW?

Local governments store and maintain large volumes of hardcopy data including tax record maps, subdivisions, utility as-builts, utility valve cards, permits and other hardcopy data. In other cases, there is simply no data in existence and information is passed as "institutional knowledge," retrieved from the memory of an organization's employees. Automating this non-digital information – that is putting the data into a spatial data format – will greatly facilitate access to the data. Benefits of data automation include:

• Enterprise access to the data through GIS.
• Ability to maintain an archival history of the data.
• Ability to accurately edit, update and maintain data for future generations.
• Ability to integrate data with other Enterprise systems (e.g. integration of parcel address data with public safety officials).
• Ability to integrate with Work Order and Asset Management Systems (e.g. Azteca CityWorks®).

GTG understands Local Government data automation needs and has succeeded on numerous occasions in developing data of various types (addressing, utilities, public safety, cadastral, planimetric) for our clients. With a proven track record showing significant return on investment, our efforts have improved our clients' operational efficiencies and created visible, tangible benefits for stakeholders and the public. A sampling of our more recent data automation projects include:

• City of Hoover, AL – complete address GIS database (address points and street centerlines), integrated with SunGard HTE.
• City of Natchitoches, LA – complete addressing GIS layers integrated with water and electric utility customer information systems.
• City of Unalaska, AK –tax parcel, utility (electric, water, stormwater, sewer), addressing, and others GIS data layers.
• City of Parkland, FL – a stormwater network using GPS field data collection combined with data extraction from hardcopy utility as-built documents.
• Levy County, FL – a complete address point and street centerline GIS databases.

With our proven track record of performing data automation projects for local government, GTG welcomes the opportunity to speak with you and your organization **more about the benefits of data** automation and how GTG can help you improve your GIS.
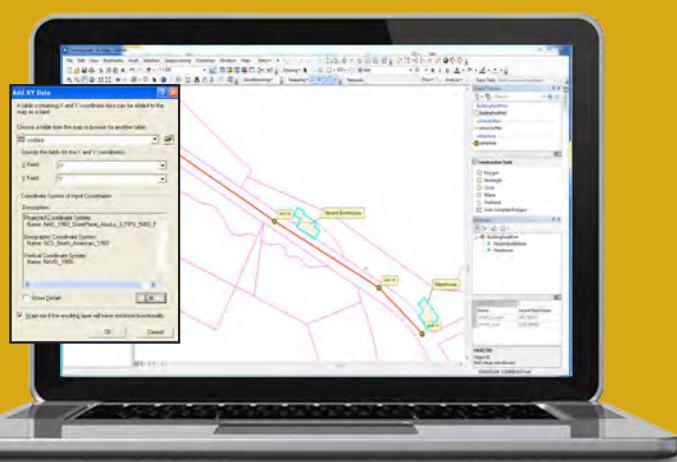
Managing Enterprise GIS Data

Local Governments that maintain an Enterprise GIS house large volumes of spatial and non-spatial digital data on their networks. In many cases, the GIS data storage scheme does not have a well-planned database design, causing haphazard, inefficient, redundant datasets. This often results in organizations not having a good understanding of what data they have, leads to data maintenance redundancies, and can result in different versions of the same data layer being distributed to multiple departments. Such problems can generate bad data, which leads to bad decisions. A well-developed database design can alleviate these issues.

Database design is the process of reviewing existing data, interviewing stakeholders about how the data is used, and developing recommendations and a design to improve storage and access to the data. GTG uses existing industry standard database designs (e.g. LGIM) and also develops custom database designs to suit specific client needs. The design determines the database structure including:

- feature datasets,
- feature classes,
- subtypes,
- attribute domains,
- relationship classes,
- topological relationships, and
- geometric networks.

GTG has been very successful in developing highly functional and efficient database designs for numerous Local Government clients. A few of our more recent clients include:

- City of Hoover, AL – ArcSDE / SQL Server database design
- Town of Wilton, CT - ArcSDE / SQL Server database design, LGIM
- City of Oviedo, FL - ArcSDE / SQL Server database design
- City of West University Place, TX - ArcSDE / SQL Server database design, LGIM
- City of Unalaska, AK - ArcSDE / SQL Server database design

A well-designed database design greatly improves the efficiencies of GIS operations, greatly improving the value of an Enterprise GIS. With our proven track record of designing and developing geodatabases for Local Government, GTG welcomes the opportunity to speak with you and your organization more about the benefits of database design and how GTG can help you improve your GIS.
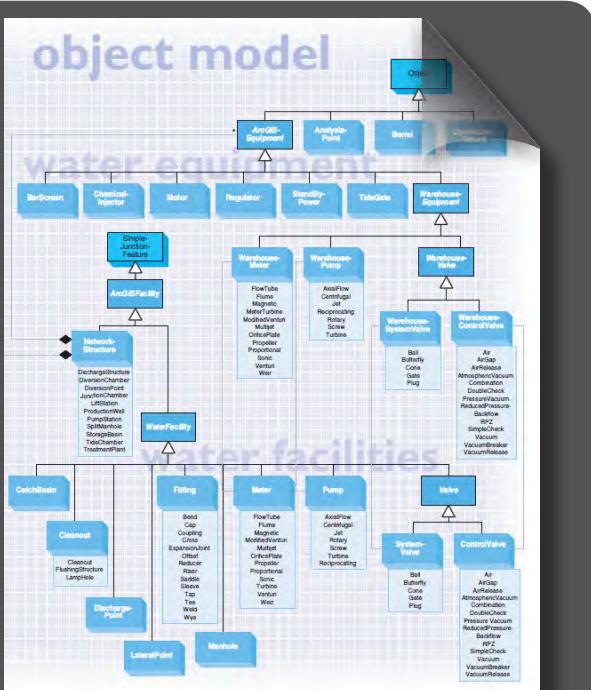
ArcGIS Sewer Stormwater UML Model

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E-bulletin

BUILDING A TRUE ENTERPRISE GIS

What's NEW?

GEOGRAPHIC TECHNOLOGIES GROUP

GTG's team of experts have helped numerous organizations achieve enterprise success and would love the opportunity to help your organization do the same.

GIS for Local Government has been around for decades. However, many organizations have not experienced true enterprise-wide GIS success. Often GIS is simply used to create informative maps or basic geographic analysis, but falls short of becoming the go-to enterprise information portal. Geographic Technologies Group (GTG) has succeeded in helping our clients bridge the gap between traditional IT applications and GIS. Our clients have been able to break down data "stovepipes" and geo-enable third-party IT solutions for use within their enterprise GIS.

GTG understands that IT integration has to be the central focus of the GIS. We have helped clients create strategies and implement the tools to integrate IT with GIS. Our clients have benefitted from active bi-directional interfaces to many of the leading IT vendors. These interfaces allow for passing of data back and forth between these corporate databases. Example enterprise systems include:

• Public Safety Call Center and CAD
• Utility Meter and Customer Information
• Property Assessment and Taxation
• Permitting and Community Development
• Work Order and Asset Management

Clients have become more efficient as they are able to view their IT data in tandem with GIS data. Direct reads, spatial views, and bi-directional tools allow our team to guarantee our clients quick successes and give new life to existing IT and GIS investments.

For example, Hoover, Alabama, has implemented GTG's GeoBlade Viewer to allow each department to have their own GIS portal. Departments access data from their IT databases, pertinent GIS data, their imaging system, and other technologies through their GIS portal. Planning, Finance, Public Safety, Hoover Public Schools, Engineering, Public Works, and other departments all are experiencing savings an increased value from their IT investments.

FOR MORE INFORMATION
call 888.757.4222, email sales@geotg.com, or simply reply to this email.

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THE VERY BEST DEPARTMENTAL WEB-BASED GIS APPLICATIONS

What's NEW?
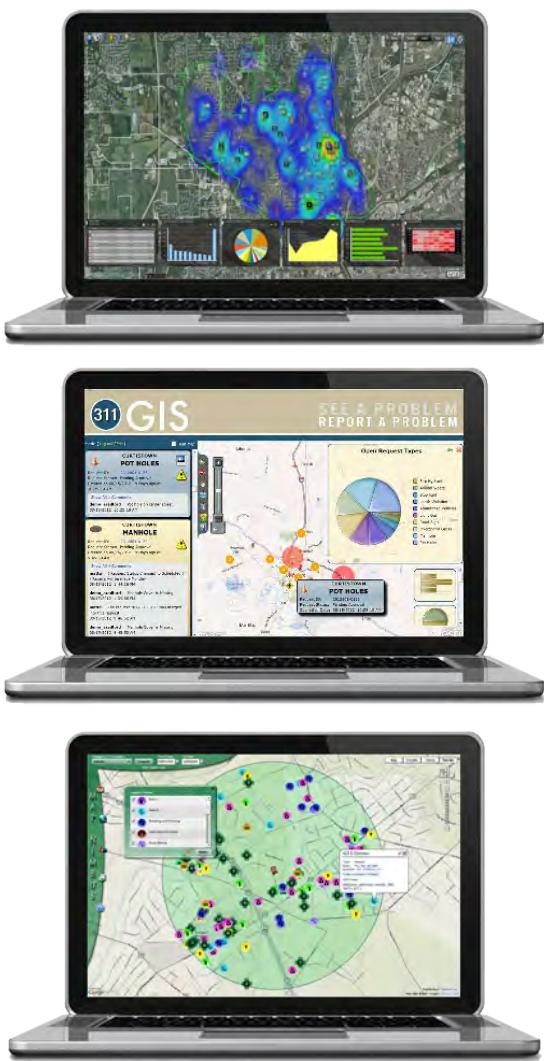
GIS is now available to everyone. GIS can be found on the average government staff member's desktop. Internal computer networks and the Internet have contributed to the GIS explosion by enabling fast and reliable access to GIS data and services. GIS is not only a standard desktop tool routinely found in local government operations, GIS also provides an important means of two-way sharing of information with the public.

GTG is well-experienced at digital mapping applications development – and particular expertise with web-based productivity tools. The following showcases a selection of GTG's web applications:

- **GeoBlade™ – GTG's GeoBlade™** suite of digital mapping products are installed in cities and counties around the country. The software suite is built upon GeoBlade Viewer, a web-based mapping application which provides map browsing, query, and reporting tools. A variety of vertical GeoBlade applications – all with the same look and feel – provide specialized tools for managing cadastral, public safety and utility operations. Working independently or as a suite of tools, GeoBlade™ AVL, Crimes, Dispatch, Search & Rescue, Address, Water & Sewer, Route and Mobile applications each provide specific and customizable toolsets designed to get the job done.
- **311GIS™ –** A public-facing web application, 311GIS™ promotes interaction between local government agencies and their citizens. The application was developed to provide local government agencies a way to allow the public to submit requests and complaints such as abandoned cars, graffiti, missing road signs, potholes, areas for rezoning or permitting. Each citizen request is automatically routed to be correct government point-of-contact, based on the type of issue submitted. This product is open-ended, compatible with FireFox, IE and Chrome, and can be used enterprise-wide.
- **MapNimbus™ –** Allows citizens to access important, relevant information from their local government using an intuitive map interface. The web application was initially developed to provide local government agencies a way to publish crime data for public consumption. However, the application has grown into a tool for the enterprise, providing the public access to a wide variety information such as sex offender locations, restaurant sanitation grades, environment information, capital improvement projects, etc.

MANAGING & MAINTAINING
THE CORE GIS ADDRESS DATABASE

What's NEW?

GEOGRAPHIC TECHNOLOGIES GROUP®

For an organization to be fully successful in the implementation of GIS and IT systems, accurate and reliable addressing must **exist. Your organization will benefit from** a systematic and enterprise approach to managing addresses. Our team of addressing experts at GTG will guarantee your success.

The success of a GIS and IT databases is inextricably tied to the availability of accurate and up-to-date information. A majority of everything a Local Government does is tied to geography: a parcel number, an x,y, coordinate, an intersection and, in many cases, an address. Managing accurate and maintaining current addresses is a challenge for most Local Governments – and the addressing challenge is multi-faceted!

First, an organization has to select an addressing standard – and there are many "standards" to choose from (USPS, NENA, URISA and others). GTG has experience with all of the important address standards, and their resulting data models. A critical first step for a Local Government is to create an addressing database design that meets the needs of the various departments and elected officials, including Assessment, Planning and Public Safety. GTG has worked with numerous Local Government clients – domestic and international – to establish customized address database designs that meet the enterprise needs of each organization.

Once an addressing model is in place, an organization must normalize and reconcile existing databases. A key component in this effort is a GIS-based address point layer. This layer should take into account:

- multi-address buildings,
- apartments and condos,
- retail, commercial and office buildings
- non-addressed structures,
- single family dwellings,
- multi-story buildings,
- vanity or alternate addresses,
- and many other factors.

GTG has helped numerous organizations successfully create 100% complete and accurate GIS address layers. This layer will then serve as the authoritative address file that is utilized by other enterprise GIS and IT databases.
Finally, as soon as the address database is in place, it must be maintained. New addresses are created; existing addresses must be edited, updated or removed. GTG has extensive experience working with Local Governments to:
- Develop data maintenance governance models and workflows,
- Build quality assurance programs,
- Write policies that establish clear addressing standards, and
- Promote inter-local agreements to lessen redundancies and encourage regional standards.

FOR MORE INFORMATION

SERVICE BUREAU SUPPORT TO DEPARTMENTS

What's NEW?

Honed by years of local government experience, GTG's Professional Services Division provides cities, counties and public utilities with expert requirements analysis, implementation planning and on-going support to ensure both a successful GIS roll-out and sustainable enterprise growth. GTG is an ArcGIS for Local Government Specialty Partner and, as such, we are intimately familiar with the ArcGIS for Local Government "Maps & Apps," including base maps, the Local Government Information Model, and supporting GIS applications and tools

GTG's database design strategies include:
- system design,
- conceptual and physical database design,
- RDBMS configuration, and
- system integrations and engineering,
- application system design,
- SDE integration.

GIS database design requires consideration of existing technology and the requirements and needs of multiple departments. These databases are fully integrated with Esri Local Government Information Model, enterprise applications, external models and system operations.

Once ArcGIS software is installed and configured, the Local Government Information Model's pre-defined schema and data dictionaries contains customizable data domains, valid values, relationships and spatial constraints to ensure the quality and integrity of the data schema and the applications it supports. GTG can assist with any desired customizing to address specific business requirements and support existing business systems. Implementing ArcGIS for Local Government helps governments get from 'planned' to 'running' very quickly with minimal investment.

The variety of ArcGIS for Local Government base maps and applications available at no charge is amazing. With more applications available all the time, the following is a brief breakdown of application categories:
- Public Works
- Elections
- Public Safety
- Land Records
- Planning & Development

These "maps and apps" support a wide assortment of local government business needs and fully integrated with the local government information model. These resources support intranet, internet and mobile models and, with the introduction of ArcGIS 10.1, many will work with "cloud" configurations. GTG is ready to help implement the cost-effective and fast roll-out of GIS-in-the-Cloud and ArcGIS for Local Government initiatives.
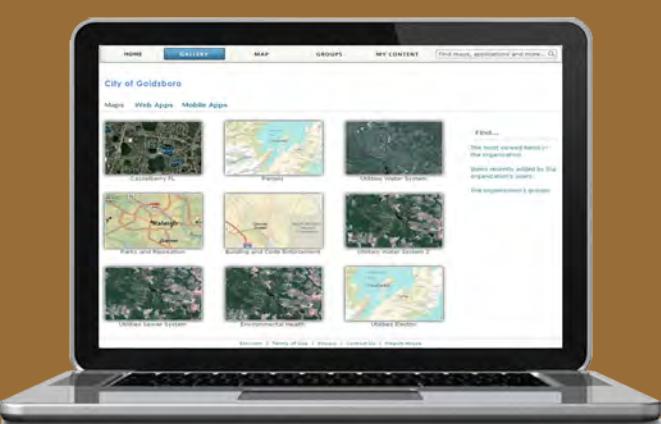
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sales@geotg.com, or

simply reply to this email.

WHY LIAISE WITH OUTSIDE ORGANIZATIONS?

What's NEW?

GEOGRAPHIC TECHNOLOGIES GROUP ®

Government is not "an island unto itself." On a very regular basis, information is shared with and between municipal, county, state and federal entities, local independent jurisdictions, utility districts, and non-government organizations.
• Sharing information yields better information.
• Better information fosters better decisions.
• Better decisions create better communities.

There may be substantial overlaps and parallel efforts between neighboring agencies and departments. Considering the amount of time and effort most Utilities, Emergency Services, Counties and Cities spend on just three GIS enterprise-critical data layers – address points, street centerlines and parcels – it makes good sense to explore opportunities to share costs and resources required to create, maintain, store and distribute this critical information. The sharing of information and data between nearby entities often results in:
• better coordination of efforts;
• opportunities for cost, data and staff sharing;
• mutually beneficial operations and special projects;
• better aligned business requirements and technical standards;
• improved public perception of "Good Government;"
• decreased costs and more flexibility for enterprise license agreements (ELA) and service-level agreements (SLA);
• a forum for collaboration and communication;
• improved opportunities for public awareness and public participation;
• reduced duplication of effort.

GTG's Professional Services Group can help local governments, first responders and public utilities develop strategic partnerships and identify cooperative opportunities. We have an expertise developing sound GIS governance models, inter-local agreements and memorandums of understanding.

Inter-local cooperation is good for the community. GIS Partnering communities benefit from collaborative GIS by sharing costs, establishing common technical standards, mitigating duplication of effort, and, perhaps most importantly, opening a channel of communication that may give way to larger inter-jurisdictional collaboration efforts.

FOR MORE INFORMATION

call 888.757.4222, email sales@geotg.com, or simply reply to this email.

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E-bulletin

MANAGING GIS LICENSING, SOFTWARE INSTALLATION, CONFIGURATION & UPGRADES

What's NEW?
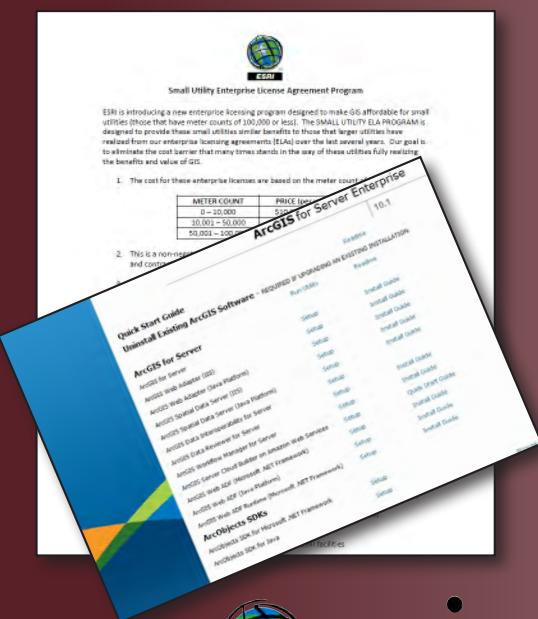
Local Governments that maintain an Enterprise GIS must deal with the licensing and maintenance of numerous software applications. Maintaining the licensing and software can become cumbersome and time-consuming – especially as the GIS grows to encompass many users. Mistakes can be expensive and cause loss of service. Various options exist for improvement including:
• Purchase an ELA (Enterprise License Agreement).
• Automate desktop software installations and service pack updates.
• Configure GIS server environments (ArcGIS Server, ArcSDE, SQL Server)

On many occasions, GTG has assisted our Local Government clients with evaluating their GIS licensing needs. In many cases, clients can save money by switching to an ELA and reducing their annual license costs. This usually results in an immediate realization of return on investment.

GTG offers our clients installation, configuration, and upgrade services for their GIS applications on both the desktop and server environments. Smaller installations are typically done manually while larger installations can be automated to expedite the process. GTG is successful in performing these services both on-site or remotely.

GTG understands Local Government needs regarding support and management of GIS application implementation and custom configuration. We have assisted numerous organizations in reducing their software licensing costs, and managing their software implementations. Recent installation and configuration clients include:

• **City of Unalaska, AK** – software installation & configuration on desktop and server; ELA evaluation and recommendations report.
• **City of Goose Creek, SC** - software installation & configuration on desktop; ELA evaluation and recommendations report.
• **Town of Wilton, CT** - software installation & configuration on desktop and server.
• **West University Place, TX** - software installation & configuration on desktop and server
• **Wicomico County, MD** - software installation & configuration on desktop and server

GTG welcomes the opportunity to speak with you and your team about the benefits of managing GTG's software licensing and installation, and how it can improve your enterprise.

FOR MORE INFORMATION

call 888.757.4222, email sales@geotg.com, or simply reply to this email.

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GTG PROVIDES THE VERY BEST TECHNICAL SUPPORT

What's NEW?

Emergency Support

Technical Support

Request for information

Training

Today's technology is moving at a rapid pace. The change is not linear - technology moves so quickly, its developmental pace is exponential. Why not have an expert on-call to answer all of your GIS hardware, software and network questions? If your municipality is facing technology and support service challenges, consider GTG's Client Services Division. We are a group of dedicated managers, trainers, software analysts, applications developers and GIS specialists committed to ensuring complete hardware, software and systems support.

GTG's Client Services takes technical support a step higher because we understand how Local Governments, Public Safety organizations and Public Utilities operate. Our Client Services support team is often able to provide technical support services for much less than it would cost many local government organizations to hire dedicated technical and user support staff. Not only is Client Services usually less expensive, but we can often provide better support than a municipality would be able to afford for itself.

We can provide customize technical helpdesk support solutions based on unique business requirements and workflows. We have a dedicated team, each with unique specialization and training, so we can provide expertise in a variety of areas. Included under our Technical Support umbrella are services for:

• Application Support
• Systems Design and Systems Integration
• Hardware and Software Installation, Upgrade and Configuration
• Application Customization and Development
• Remote Systems Administration
• Data Digitization, Migration and Validation
• Cloud Services, Hosting Services, Data Storage and Data Distribution
• Database Design and Modeling

Client Services is able to provide timely Help Desk support services through email, telephone, remote log-in and on-site. Support is generally available weekdays from 8am through 5 pm; however, after-hours and weekend support available by request. GTG's Emergency Technical Support Team is on-call 24/7. Our Client Services Division ensures questions are answers and problems are solved.

FOR MORE INFORMATION
CALL 888.757.4222 • ASK FOR DAVID HOLDSTOCK, CEO
OR SIMPLY REPLY TO THIS EMAIL!

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GIS FOR ELECTIONS
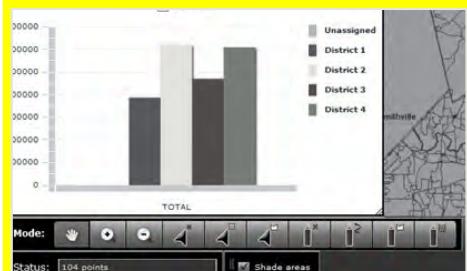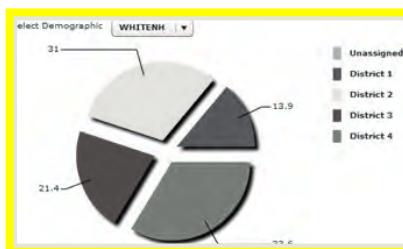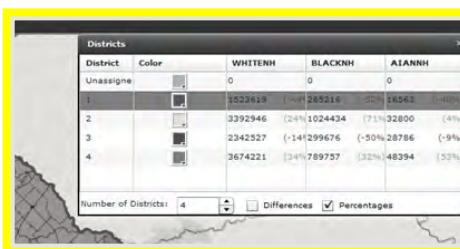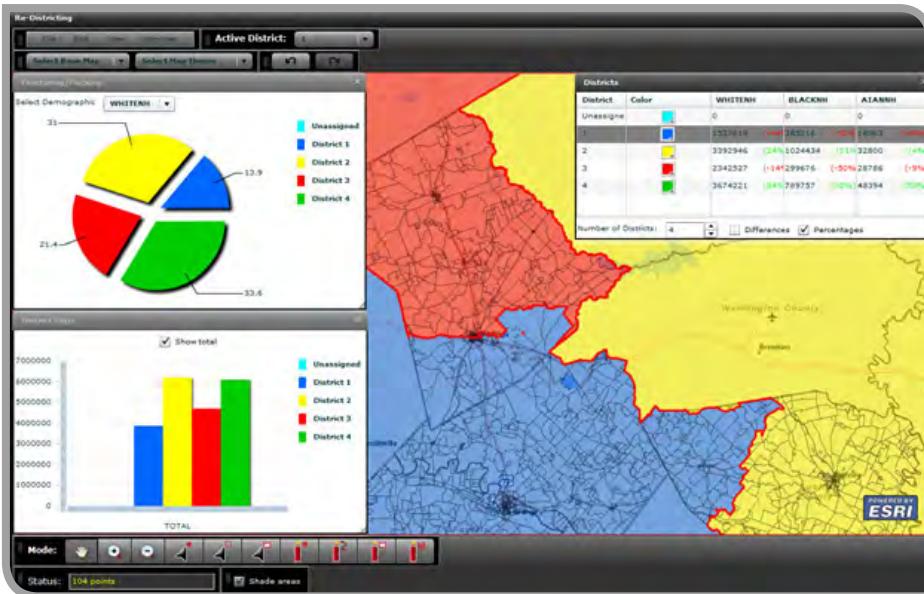
The use of GIS needs to be supported by a clear return-on-investment (ROI) business case. Election offices should map the location of all of their registered voters. This will allow staff to quickly ascertain which precinct, voting district, and jurisdictional boundary in which a constituent resides. Additionally, GIS can then be utilized to balance precincts. Boundary lines can quickly be realigned and total voters by precinct can be balanced while still considering Federal and State voter mandates. GTG assisted Wayne County, North Carolina in mapping out the location of all voters and balancing precincts. The County had precincts that had over 6000 registered voters while others had only a few hundred. The County wanted to balance the precincts to within 100 voters of each other. Additionally, the boundaries needed to adhere to district boundaries as much as possible to reduce the amount of different ballots at a precinct. The goals were achieved and voting day ran smoothly with few people having to wait in line to vote. With GIS, Elections Offices allow citizens access via the Internet to information about where to vote and the districts in which they reside. Elected officials understand the ROI of an improved voting experience for their constituency.

GIS FOR HAZARD MITIGATION
– PREPAREDNESS, RESPONSE, & RECOVERY

What's NEW?

In emergency management, hazards can be classified as natural (floods, epidemic), man-made (caused by criminal or negligent actions), or technological (toxic waste, radiation leaks). Hazard mitigation is the effort to reduce or eliminate risk to human life and protection of property by reducing, eliminating, deflecting or avoiding potential hazards. Hazard mitigation follows the following steps:

- Planning & Mitigation: Evaluating the potential types of disasters and developing plans to reduce their probability or impact on life, property and resources.
- Preparedness: Planning the actions to be undertaken when mitigation efforts have not or cannot prevent a disaster from taking place.
- Response: Pre-disaster evacuation, resource pre-positioning and post-event activities that are intended to identify and assist victims and stabilize the overall disaster situation.
- Recovery: Actions following a disaster designed to restore normalcy of human, economic and environmental systems.

Well-planned emergency management requires a harmonious collaboration between city, state and federal stakeholders. When emergencies happen, department managers, elected officials, local businesses and regional institutions must clearly understand expectations and responsibilities. Geographic Information Systems (GIS) support a variety of emergency management planning, preparation, response and recovery activities.

GIS has proven itself time and again an integral tool in emergency planning and disaster response. GIS as a tool in emergency management can been used in the planning and mitigation phase for managing the large volumes of data needed for the hazard and risk assessment. In the emergency preparedness phase, GIS is an invaluable tool for planning evacuation routes, facility pre-planning, hazardous materials mapping, and the design of disaster warning system. In the emergency relief phase, GIS, in combination with GPS (Global Positioning System) is extremely useful in search and rescue operations in areas that have been devastated and in areas where it is difficult to orientate. During the recovery phase, GIS is used to organize the damage information and post-disaster census information and in the evaluation of sites for reconstruction.

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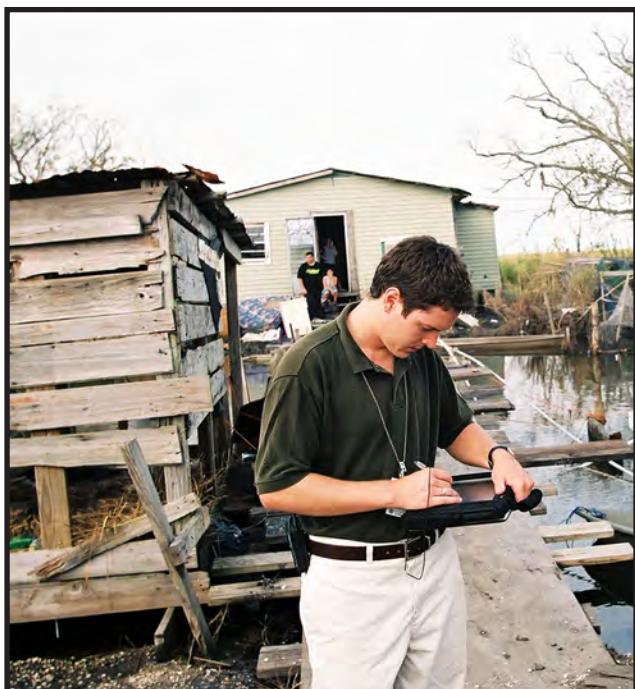
GIS - A BUSINESS PLAN

What's NEW?

If implementing a new Geographic Information System (GIS) or expanding an existing one, a business plan is a critical first step in defining the system, justifying the expenses, and securing funding. A business plan defines
• the system's near- and long-term goals and objectives,
• describes GIS products and services that will be provided, and
• enumerates start-up costs, on-going expenses and return-on-investment estimates.

Completing the plan forces a detailed examination of management, marketing, personnel and finance in an objective and organized way. A business plan should be concise, compelling and complete. It generally consists of seven key components:
• Executive summary
• Business description
• Market strategies
• Competitive analysis
• Design and development plan
• Operations and management plan
• Financial factors

A typical business plan includes numerous charts, graphs and tables to illustrate trends and demonstrate thoroughly researched information. The plan may even include local government case studies demonstrating best management practices (BMP) or other cost-saving government operations trends.

Once completed, the business plan will prove invaluable while endeavoring to secure funding. In addition, a business plan will be invaluable when developing regional GIS consortia or other multi-agency joint-ventures. Business plans tend to be static in nature – once a GIS has been funded and an Implementation Plan completed, the business plan tends to become outdated. A business plan should be revisited as the GIS grows or needs change.

Although a plan is time consuming and required a great deal of research, a business plan is important to the ultimate success of a GIS project. Without a good business plan, a GIS implementation will likely drift without direction and have no measures of success. To overcome these initial hurdles, Geographic Technologies Group is available to assist develop a winning business plan.

FOR MORE INFORMATION call 888.757.4222 or email sales@geotg.com

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GIS - A PLAN OF ACTION

What's NEW?

Although GIS can differ greatly, most effective systems are planned and implemented following a structured process that ensures the GIS ultimately meets end-user and organizational needs. Planning is the most important step for any GIS, large or small. It provides the foundation upon which full GIS implementation and operations will rely on. Organizations planning large, complex, multi-purpose GIS systems will require more extensive planning, while smaller implementation may require less toil.

The first aspect of GIS planning requires scope definition. Here, the role of the GIS within the organization is defined. Decisions are made as to the types of applications and users the GIS will ultimately support, as well as any integration with other local or enterprise applications will be required. Ultimately, the scope statement will define how the GIS will affect the way an organization will do business.

The scope statement determines who will be involved in the GIS design and implementation. Participants may include users, managers, policy makers and consultants. The core GIS implementation team and the project manager will be designated. GIS training and orientation should be provided to team members, based on individual needs and ability.

The scope statement will also provide an indicator of the amount and type of resources that may be required, at least, at this very early stage, by orders of magnitude. Resources to consider include money, timeframe, labor and skills. At the same time, an estimate of the benefits a GIS may generate should be considered and a return-on-investment (ROI) or feasibility study performed. Even though estimates made at this early stage are imprecise, they will help establish basic planning goals and resource requirements.

Finally, a general plan is developed. For a small, single-purpose GIS implementation choices and planning options may be apparent and easily made. Larger and more complex GIS implementations require more complex and thorough planning methods, exploring multiple options and scenarios.

Geographic Technologies Group is experienced with the complete GIS planning process and offers assistance on implementations of every size.

4 Steps to Implementation

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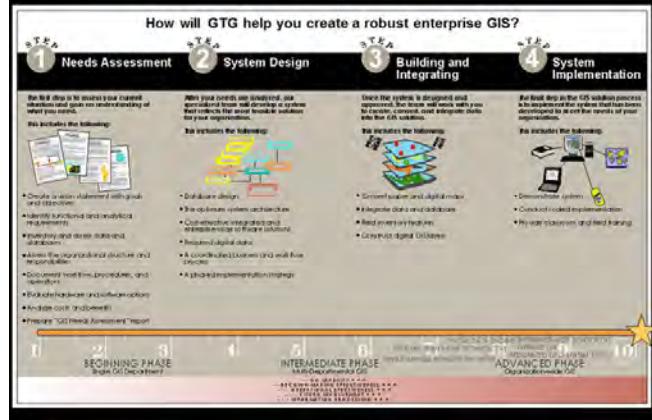
GIS - ALTERNATIVE CONCEPTUAL SYSTEM DESIGN

What's NEW?

Conceptual GIS Enterprise Architecture
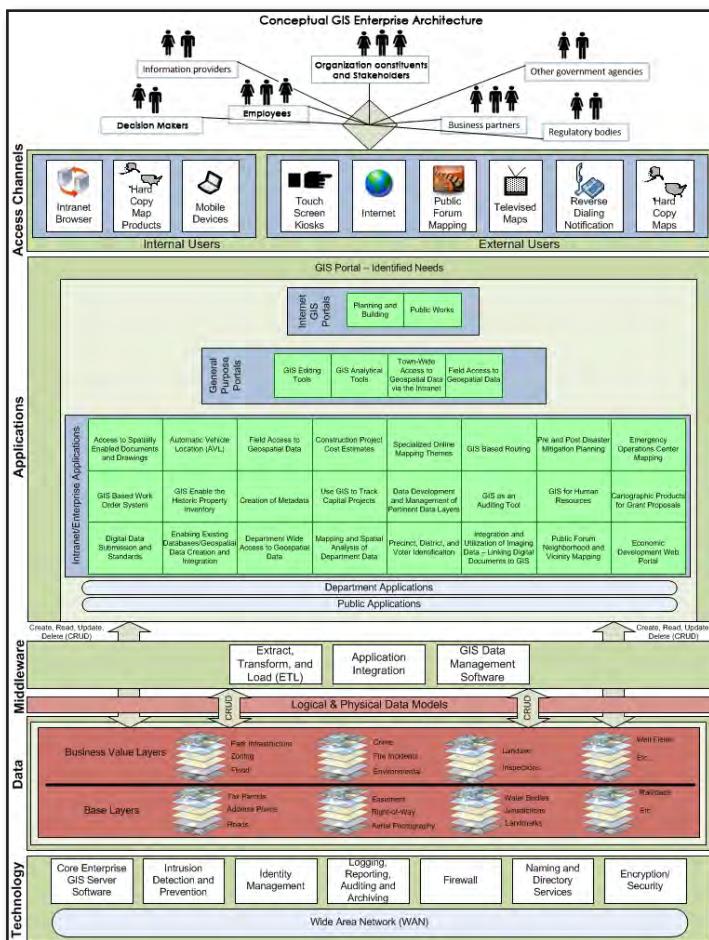
Geographic Information System (GIS) database design is a system planning activity where the contents of potential or actual geospatial databases are identified and described. The process allows the GIS database to be viewed in its entirety, allowing the evaluation of data records, fields and attributes. Database design is usually divided into three major activities:

• Conceptual data modeling - identifying data content and describing data at an abstract, or conceptual, level;

• Logical database design - translation of the conceptual database design into the data model of a specific software system; and

• Physical design - representation of the data model in the schema of the software.

To achieve a good database design, the conceptual model must contain all of the data needed to meet the GIS users' and applications' needs. The conceptual data model must be directly transferable to the logical and physical designs. The conceptual design must be

• independent of hardware and software constraints,

• describe and define entities and attributes,

• define feature relationships and dependencies.

Conceptual modeling is the representation of the functional application requirements and the GIS system components at an abstract level. The primary means of mapping a conceptual model is through entity-relationship modeling. The E-R modeling uncovers many inconsistencies or contradictions in entity definitions, relationships and attributions. Often, it is possible to build many different E-R diagrams for the same data. This process allows designers to develop the most efficient conceptual model needed to support GIS operations and applications.

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HOW TO CONDUCT A COMPREHENSIVE
GIS NEEDS ASSESSMENT

What's NEW?

GEOGRAPHIC INFORMATION SYSTEMS (GIS) PHASED STRATEGIC IMPLEMENTATION PLAN

USER NEEDS ASSESSMENT
QUESTIONNAIRE

GEOGRAPHIC TECHNOLOGIES GROUP
UNDERSTANDING LOCAL GOVERNMENT
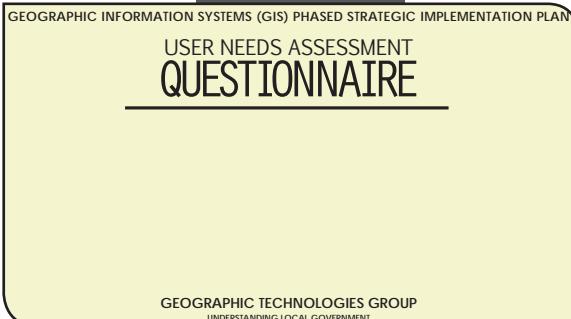
CITY OF WEST HOLLYWOOD

GIS PROJECT KICK-OFF MEETING AND TECHNOLOGY SEMINAR
Monday, April 15, 2013
9:00 - 11:00
**GIS NEEDS ASSESSMENT AND
STRATEGIC IMPLEMENTATION PLAN**

A. Introduction to Geographic Technologies Group (GTG)
   • State, National, International GIS Awards*
   • Project Team's GIS Experience and Competence
      • Two Owners and Resumes of Team
         o Publications and Awards
B. What is GIS?
   • Components of an enterprise solution
   • Functions and uses within City government
C. The GIS Needs Assessment and Strategic Implementation Plan
   • Project Goals and Objectives
      • Needs Assessment
      • System Design
      • GIS Strategic Implementation Plan
   • Project Schedule
      • Milestones and Deadlines
      • Important role of stakeholders
   • Project Methodology
      • The Seven Keys to GIS Success
      • The Four Main Steps to GIS Implementation
      • GIS Governance Options-"A Management Strategy"
      • GIS Needs Assessment Interview Process and Interview
        Guide and On-line Questionnaire
D. An Enterprise GIS Vision, Goals and Objectives
E. Critical Issues for building a true Enterprise GIS within the City of West
   Hollywood – Best Business Practices and Case Studies
   1. Enterprise GIS Architecture
   2. Governance Models
   3. Cost Sharing Models
   4. Intergovernmental Agreements and Partnerships
   5. Best Business Practices – Case Studies
      o Orange County, CA
      o Town of Windsor, CA
      o City of West Sacramento, CA
      o City of Unalaska, AK
      o City of Champaign, IL
      o City of Winston-Salem, NC
      o City of Cocoa, FL
      o City of Titusville, FL
      o City of Midland, MI
      o City of Salisbury, MD
      o Calvert County, MD
      o Forsyth County, NC
      o Campbell County, WY
      o Wicomico County, MD
      o San Louis Obispo County, CA
      o Yuma County, AZ
      o Lenoir County, NC
      o Duplin County, NC
      o City of Virginia Beach, VA
      o Town of Davie, FL
      o Other Key Organizations
   6. Live Demonstration of state-of-the-art GIS software solutions
F. 2013 City of Hollywood's GIS Strategic Implementation Plan
   • The End Product – Developing the roadmap for the City
G. Question and Answers

A GIS Needs Assessment must include a careful evaluation of the needs of **all departments and stakeholders within your organizations,** and the eventual production of a multi-year, phased GIS Strategic Implementation Plan that will guide the continued development of your GIS. A Needs Assessment will ensure t**hat the GIS program grows in a structured, optimum manner, serving all departments.**   A Needs Assessment must be accompanied by three other components:
   • Phase II: Conceptual System Design
   • Phase III: GIS Business Plan
   • Phase IV: GIS Plan of Action

A comprehensive GIS Needs Assessment should include:
Technical Workshop
Prior to interviewing all your departments and stakeholders, it is recommended that you conduct a GIS Technology Workshop for all potential GIS users within your organizations. The workshop will describe the existing status of GIS within your organization, outline the goals and objectives of the project, emphasize and focus on consensus-building, listening and recording the needs of all departments. It should include a discussion and overview of the following:
   o Vision, Goals, and Objectives
   o Data and Databases
   o Hardware and Infrastructure
   o Software
   o Business Processes
   o Management, Governance, and Training
   o End-User Requirements
   o Current GIS and Geo-spatial Conditions
   o Process Bottlenecks
   o Data Sources and Data Requirements
   o Opportunities for Change

The GIS Needs Assessment should be conducted using hardcopy questionnaires, supplemented by on-line survey tools. The GIS Needs Assessment questionnaire should be tailored to the specific needs of each department. It should focus on all important information required for the development of an enterprise-wide GIS Implementation Plan.   The following are the key issues expected from the GIS Needs Assessment:
   • Interview current GIS technology users and understand their roles
   • Identify City and non-City stakeholders in the GIS system
   • Document business related practices and processes
   • Review of existing and potential departmental GIS programs throughout the organizations
   • List GIS staffing including users, creators, and developers
   • Develop current data catalog and document data flows

E-bulletin

HOW TOWNS, CITIES, & COUNTIES ARE SAVING MONEY OR INCREASING REVENUE WITH ENTERPRISE GIS

What's NEW?

Saving Money - The Return-on-Investment

☑ **SAVING MONEY**
GIS results in cost savings and cost avoidance. Immediate savings can be seen through better decisions and increased productivity. Cost avoidance becomes apparent as GIS helps organizations reduce and eliminate costs.
- GTG Case Study: Boynton Beach, FL
- GTG Case Study: Wayne County, NC
- GTG Case Study: Town of Windsor, CA
- GTG Case Study: San Luis Obispo County, CA

☑ **SAVING TIME**
Having the information when you need and want it saves time, staff resources and money. Information can be made available to the public through a web site or touch screen kiosks in convenient locations, reducing demands on staff.
- GTG Case Study: City of Jacksonville, NC
- GTG Case Study: Calvert County, MD

☑ **INCREASING PRODUCTIVITY**
Access to accurate, current information instantly saves the staff from having to waste time searching for lost data or trying to correct inaccurate data. Accurate digital and electronic GIS mapping can be easily accessed by and shared among all departments.
- GTG Case Study: City of Bend, OR
- GTG Case Study: Wilson County, NC

☑ **IMPROVING EFFICIENCY**
GIS helps organizations reduce and eliminate redundant steps in workflow processes. GIS programs help reduce workloads and facilitate new procedures, resulting in increased productivity and efficiency.
- GTG Case Study: City of Midland, MI
- GTG Case Study: City of Pearland, TX

☑ **IMPROVING DATA ACCURACY**
GIS creates maps from data; or paper maps can be digitized and translated into GIS. Maps can be created on any location, at any scale, and showing selected information to highlight specific characteristics. Precise GIS data enables users to generate accurate reports and produce quality maps instantly.
- GTG Case Study: City of Davie, FL
- GTG Case Study: Orange County, NC

☑ **MAKING BETTER DECISIONS**
GIS is a critical tool to query, analyze, and map data in decision support. GIS can, for example, be used to choose a location for a development that has minimal environmental impact, is located in a low risk area, and is close to a population center.
- GTG Case Study: Tooele County, UT
- GTG Case Study: City of Gillette, WY

☑ **SAVING LIVES**
In an emergency, when every second counts, GIS can lead rescuers quickly and accurately to the scene. The time saved in locating a citizen can be the difference between life and death.
- GTG Case Study: City of Decatur, IL
- GTG Case Study: City of Alexandria, VA

☑ **AUTOMATING WORK-FLOW PROCEDURES**
GIS helps automate tasks that expedite work-flow and enhance your ability to react efficiently during a crisis. GIS can automate routine analysis, map production, data creation and maintenance, reporting, and statistical analysis.
- GTG Case Study: UNC Chapel Hill, NC
- GTG Case Study: Forsyth County, GA

☑ **IMPROVING INFORMATION PROCESSING**
Enterprise-wide GIS streamlines the flow of information throughout the organization, leading to better accuracy, better access, and increased efficiency in every aspect of the organization.
- GTG Case Study: City of Kissimmee, FL
- GTG Case Study: City of St. Helens, OR

☑ **COMPLYING WITH STATE AND FEDERAL MANDATES**
Digital inventories of water, sewer, and storm water infrastructure are becoming increasingly important in local governments. A complete GIS program includes asset management, inventory control, and depreciation based on accurate and timely data including age, size, and construction materials; this allows managers to predict and schedule repairs and replacement.
- GTG Case Study: City of Pearland, TX
- GTG Case Study: City of Midland, MI

☑ **PROTECTING YOUR COMMUNITY**
GIS helps public safety officials develop emergency plans and respond to disasters more effectively than ever before. GIS provides tools to monitor conditions, recognize threats, predict consequences, and respond effectively and efficiently to man-made or natural disasters. GIS can also help officials deliver information to citizens during an emergency, through emergency notification systems and the Internet.
- GTG Case Study: Nags Head, NC
- GTG Case Study: City of Valdez, AK

☑ **IMPROVING COMMUNICATION, COORDINATION, AND COLLABORATION**
Good communication is the key to running an effective organization. GIS helps staff and elected officials convey complex information in easy-to-understand formats.
- GTG Case Study: City of Danville, VA

Towns, cities and counties across the United States using their enterprise GIS deployments to quantify a Return-on-Investment (ROI). GIS and geo-spatial technology can save lives, inform and notify the public, prevent local government from being fined, improve efficiency, eliminating duplication, and predict events and infrastructure failures.

GIS RETURN ON INVESTMENT

PLANNING, DESIGNING, AND IMPLEMENTING GIS FOR SMALL TOWNS, CITIES, AND COUNTIES

What's NEW?

There are many challenges and pitfalls to implementing GIS in our smaller towns, cities, and counties. However there are many real-world examples that detail the opportunity and successes GIS affords small local government organizations.

GIS SUCCESS IN SMALL COMMUNITIES

There are some essential elements required in the planning, designing, implementing and managing an enterprise GIS for small towns, villages, cities, and rural counties. The principles that underpin success include how to make GIS easy to use and indispensable throughout your organizations? How to develop goals and objectives for your small departmental operations? How to present the benefits and costs of GIS, and how to show measurable and attainable successes?

It is essential to:

- Understand the methodology behind developing a GIS vision for your organization
- Develop a vision for your GIS
- Secure buy-in from elected officials and management
- Identify funding and investment strategies
- How to manage, coordinate and govern your GIS, and make good cost-effective GIS investment decisions.
- How to eliminate data inaccuracies, redundancies, and duplication.
- How to educate and inform an organization, and remove all obstacles to success.
- Show the problem solving nature of GIS and try to quantify the value proposition of GIS. In today's economic climate, the art of selling GIS technologies has never been more important. The art of the "value proposition" for smaller organizations is critical. Why is GIS invaluable? What are the tangible and intangible benefits? Most of all, how do you sell GIS technology to elected officials, management, and the public
- Know your Infrastructure needs. It is important to know what computer hardware, software, communications, and necessary peripheral devices are needed for a successful GIS program. This will allow you look at a total view of an enterprise GIS solution as it relates to optimum infrastructure.
- Consider cloud computing and the benefits of this enterprise architecture.
- Even for small organizations, training and education is an important part of the solution.

E-bulletin

SELECTING MOBILE AND WIRELESS GIS AND GPS FIELD APPLICATIONS

What's NEW?
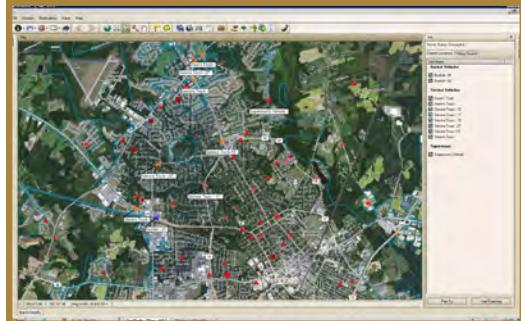
What field tools and techniques should be employed by Public Works and Utility Departments to manage and maintain water, sewer, storm water, gas and electric systems?

It is economically critical to identify the most prudent and efficient way to collect and manage geospatial information about utilities infrastructure. Improving field efficiency can save hundreds of thousands of dollars. Technology is changing daily and with it so should government operations. Unfortunately many government organizations have the following characteristics:

- Limited GIS use in the field
- Lack of confidence in the GIS data quality and spatial accuracy
- Data sharing is limited
- Varying standards and operating procedures
- Limited network connectivity in the field
- No effective global positioning systems (GPS) for field asset management
- No GIS automation capabilities in the field
- Limited access to GIS
- No GPS navigation and automated vehicle location (AVL) technologies.
- No digital photography and laser rangefinder technology in the field
- No automated workflow and standard operating procedures used

The functionality and application of global positioning system (GPS) technology, automated vehicle location (AVL) and GIS software continually change the landscape of field operations. An evaluation of technology, procedures and standards for performing "office to field and field to office" tasks must be performed and optimum solutions found. Finding the right solution will save millions of dollars!

The first phase of any project that is challenged with finding the best field solutions includes:

- How accurate is your existing GIS infrastructure?
- Are there any best business GIS data accuracy standards for water, sewer, storm water, gas and electric?
- What is the best way to improve (or bring to a standard of accuracy) your existing digital infrastructure?

What field tools and techniques should be employed to manage and maintain infrastructure systems?

ASK GEOGRAPHIC TECHNOLOGIES GROUP

CITY HALL
1110 West Capitol Avenue
West Sacramento, CA 95691

City Council
City Manager
City Clerk
Human Resources
(916) 617-4500
Fax (916) 372-8765

Information Technology
(916) 617-4520
Fax (916) 372-8765

Community Development
Planning
Engineering
(916) 617-4645
Fax (916) 371-0845

Building
(916) 617-4683
Fax (916) 371-0845

Parks & Recreation
(916) 617-4620
Fax (916) 372-5329

Redevelopment
Economic Development
(916) 617-4535
Fax (916) 373-5848

Grants & Community Investment
(916) 617-4555
Fax (916) 372-1584

Finance
(916) 617-4575
Fax (916) 373-9006

Utilities
(916) 617-4589
Fax (916) 373-9006

Refuse & Recycling
(916) 617-4590
Fax (916) 373-9006

Fire Administration
(916) 617-4600
Fax (916) 371-5017

POLICE
550 Jefferson Blvd
West Sacramento, CA 95605

Police
(916) 617-4900
Fax (916) 373-2377
Code Enforcement
(916) 617-4927

PUBLIC WORKS
1951 South River Road
West Sacramento, CA 95691

(916) 617-4850
Fax (916) 371-1516

www.ci.west-sacramento.ca.us

April 23, 2014

To Whom It May Concern:

As the former IT Manager for the City of West Sacramento, I would like to provide this letter of recommendation for Geographic Technologies Group (GTG). GTG was awarded a contract to complete the City's Enterprise Strategic Plan. The City did not have a GIS system prior to awarding the contract to GTG to complete our Enterprise Strategic Plan.

Because of the comprehensive strategic plan, I believe that that we are now leading the region with our GIS development initiatives. GTG played a fundamental role in the City's success. GTG provided an in-depth and detailed document that we can use for all of our GIS initiatives.

GTG has both the experience and expertise, to not only develop plans for start-up GIS systems, but for mature and comprehensive systems. They were able to provide direction to our multiple stakeholder groups and organize a GIS system that met the needs of the enterprise and end-use departments. Their methodology and presentation were exceptional. They were very responsive and put the needs of the City first and foremost throughout the entire process.

The GTG team is very capable and can provide a wide range of services for numerous platforms and applications. I highly recommend GTG for any future service with the City and to other entities requiring assistance with their GIS systems.

If I can provide any further information or assistance, please contact me at 916-617-4515 or email me at drewg@cityofwestsacramento.org.

Yours truly,

A.E. Drew Gidlof III
Construction Operations Manager

April 24, 2014

To Whom It May Concern,

The Town of Davie contracted with Geographic Technologies Group to develop a GIS Strategic Plan. GTG submitted a proposal through a competitive bid process which clearly demonstrated that they were the most qualified vendor. GTG did not disappoint. Their GIS team set out by conducting a Needs Assessment that required that each department and stakeholder within the city be interviewed. GTG provided a thoroughly documented Needs Assessment that was used to create a multi-year GIS Strategic Plan. They provided direction to our numerous stakeholders and departments and organized a GIS system that meets our needs and will allow us to grow in a planned, optimum manner. Their methodology and presentation is second to none. They are highly responsive and put the needs of the customer first throughout the entire process.

Best regards,

Irene DeGroot
GIS Manager

GIS 4-2-14

COUNTY OF SAN LUIS OBISPO
Information Technology Department
County Government Center - Room 400, San Luis Obispo, CA 93408
(805) 781-5050   FAX: (805) 781-1388
Janette D. Pell, Chief Information Officer

January 28, 2008

Mr. David Holdstock
Mr. Curtis Hinton
Geographic Technologies Group
1202 Parkway Drive
Goldsboro, NC 27534

Re. GIS Strategic Planning and GTG

Dear David & Curt,

I would like to thank you both for the excellent customer service and teamwork we are experiencing with Geographic Technologies Group as we develop our GIS Strategic Plan. Though we have another month to go to finish the plan, the collaboration on this effort has been nothing but easy, professional, and a very positive experience.

During the Request for Proposal process your firm was responsive to our requests for information and your proposal was specific to San Luis Obispo County yet your experience and recommended best practices came through loud and clear. Your firm was selected unanimously by our project team.

Now as we're developing the GIS Strategic Plan itself we're finding that the collaboration amongst your staff during each phase of the development, the excellent writing and listening skills you and your staff possess, and the focus on the needs and best solutions for San Luis Obispo County including Return on Investment is building confidence internally that we will have a great GIS Strategic Plan for years to come. It is apparent that your company is extremely well managed and that you and your staff are dedicated to providing great service and solutions for your customers.

Thank you for all of the efforts of your wonderful staff. We look forward to continuing this endeavor in the coming weeks.

Very truly yours,

Susan Pittaway
Project Manager

March 18, 2008

Emily Jungblut-Swinarski
Business Development Assistant
Geographic Technologies Group
1202 Parkway Drive
Goldsboro, NC 27534

Dear Ms. Jungblut-Swinarski:

I'm guessing that the Strategic Plan provided by GTG isn't your typical GIS Strategic Plan. Most importantly I believe my colleagues and I are confident that GTG presented us with an exceptional and practical plan to address GIS needs here in San Luis Obispo County. I for one sincerely appreciated the genuine empathy – not salesmanship – demonstrated by both David and Curtis while they interacted with county staff.

Most gratifying about GTG is their versatility in conveying technical ideas and strategies that are clear, concise, practical and sound. The GIS Strategic Plan for San Luis Obispo County is structured in an appealing pragmatic format: i.e. "SEVEN KEYS TO GIS SUCCESS", containing numerous no-nonsense strategic approaches and actions. I appreciated that within the recommended schemes or strategies, GTG drew from a wide range of resources: anecdotes, business, historical insight, and their own diverse experience.

GTG knows as well as anyone that practicing what they preach is tough. One thing that stood out for me was David and Curtis's persistent honest and trustworthy communication, which makes them an inspiring testimonial for GTG's own consulting services.

Sincerely,

Victor Holanda, AICP
Director
San Luis Obispo County Planning and Building Department

To whom it may concern:

Orange County contracted with Geographic Technologies Group (GTG) for the creation of a GIS Strategic Plan. The GTG team was clearly the most qualified and was selected after a competitive bid process. The project required that GTG's GIS experts interview each department within Orange County as to their current uses of GIS and their GIS needs. This information was thoroughly documented in a Needs Assessment. The resultant data was then used to create a multi-year plan that included an optimal governance model, recommendations for a central GIS data warehouse, and the dissemination of GIS to all departments and the public.

GTG was required to present the finding to our GIS Steering Committee and then to a larger group of representatives from all County departments. GTG worked closely with Orange County to craft a solution that was both workable and understandable. GTG staff possesses a deep knowledge of GIS and how it relates to existing IT investments. As past local government employees, GTG staff related very well to our end users. They understand the challenges faced by local government.

Based on all of this, Orange County was very happy with GTG and their deliverables. I would not hesitate to recommend GTG for any GIS related projects. Their dedication to insuring that their customers get a quality product exceeded our expectations. If you need any further information, do not hesitate to contact me at 714-834-7022 or via email at Quazi.hashmi@ocgov.com.

Sincerely,

Quazi Hashmi
Program Manager
Office of the CIO
County of Orange

May 8, 2006

David Holdstock
Geographic Technologies Group
648 North Spence Avenue
Goldsboro, NC, 27534

Subject: Professional Reference

To whom it may concern:

This is a letter of recommendation for Geographic Technology Group (GTG). GTG was awarded a contract to complete the City of Virginia Beach's Enterprise Strategic Plan. Virginia Beach, Virginia, is a mature 30 years GIS site. GTG is in the act of providing a comprehensive GIS Strategic Plan. GTG has exceeded our expectations by providing an in-depth and detailed document that we can use for many different GIS initiatives. GTG has the experience and expertise to not only develop plans for start-up GIS systems, but for mature and comprehensive systems like ours. They are able to provide direction to our multiple stakeholder groups and organize a GIS system that meets both the needs of the enterprise and end-user departments. Their methodology and presentation are second to none. Their team is very capable, deep and can provide a wide range of services for a number of different platforms and applications. They are highly responsive and put the needs of the customer first and foremost through the entire process. I highly recommend GTG for any future service with the City and to other GIS systems.

If I can provide any further information or assistance, please contact me at 757-385-8462 or e-mail me at rjessen@vbgov.com.

Sincerely,

Robert Jessen

GIS Coordinator
City of Virginia Beach

1019 Main Street
Phone 203.315.0617   Branford CT 06405   www.branford-ct. gov

12 November 2010

To whom it may concern,

The Town has been using Geographic Information Systems (GIS) for over 12 years. From our initial application of mapping the entire sewer system we have branched out to where we are working with every department. We have a GIS steering committee who assists in prioritization of work. We also have a GIS Coordinator (reporting to me) who maintains the data and documentation (Metadata). We use ESRI as our application software with an ArcEditor license used by the Coordinator and 3 ArcReader licenses used by the "more experienced" users. The general public has access to the GIS data through a outsourced service with an ArcServer license for this purpose.

About this time last year I posed this question to the Committee "How do we know what we don't know?" The gist of the question was targeted at being sure the Town's investment of over $1 million dollars since inception was following Best Practices. My concern was that while I believed we were doing all the right things to verify the accuracy of the data and it's use, I wasn't qualified to say we were doing all that we should be and in the right way. With the recommendation of the Committee I successfully went before the various approval Boards to get capital money for a Best Practice's Analysis and Recommendations.

In order to get the broadest response I went to public bid, but with a fixed cost for the study. I am very pleased to say that after reviewing the four (4) responses Geographic Technologies Group was the unanimous choice of all of our users. Comments such as "there is no second choice", "no brainer" and "why did you even ask as the choice is so obvious" made the study a well-supported one. Having recently received the "GIS Needs Assessment" for each of the eight main user departments, it is very obvious that GTG did a very thorough job in interviewing for needs. We look forward to their recommendations as they hit a home run on identifying needs. I would recommend GTG to any municipality for a Best Practice's study.

Peter R .Hugret
Information Technology Director

City of Titusville

555 South Washington Avenue
Titusville, FL 32796-3584
Post Office Box 2806 (32781-2806)

Phone: (321) 383-5701
Fax: (321) 383-5811

David Holdstock
Geographic Technologies Group
1202 Parkway Drive
Goldsboro, NC, 27534

Subject: Professional Reference

To whom it may concern:

This is a letter of recommendation for Geographic Technologies Group, Inc. (GTG). The City of Titusville decided to create a City-wide GIS in 2007. Fourteen firms responded to our RFP for a GIS Needs Assessment and Implementation Plan and our search committee chose GTG unanimously. The knowledge and skills their highly capable team possesses made them stand out from the rest and their presentation was flawless. Implementation has started on the three-year Plan and GTG has proven to be extremely responsive to our needs. The methodology used by GTG to develop the plan makes it easier to follow and to maintain our established budget.

If I can be of any further assistance, please do not hesitate to contact me.

Sincerely,

Rick Story

Rick Story
Director of MIS
City of Titusville, Fl
Office: (321) 383-5787
Fax: (321) 383-5811
Email: rick.story@titusville.com

A City of Service, USA

January 24, 2008

David Holdstock and Curtis Hinton
Geographic Technologies Group
648 North Spence Avenue
Goldsboro, NC, 27534

Subject: Professional Reference

To whom it may concern:

This is a letter of recommendation for Geographic Technologies Group, Inc. (GTG). GTG was awarded a contract to complete a GIS Strategic Plan for the City. GTG's approach to the plan was practical, inclusive of all departments and City staff, and they addressed the issue of plan funding. GTG has exceeded our expectations by providing an in-depth and detailed document that we will continue to use. The document is built to be sustainable and flexible as well.

GTG's knowledge and experience was not only evident in their consulting experiences, but also in the fact that the principals were actually in municipal government position. Their methodology was solid and grounded in the overall experiences that they have had. Besides meeting all our expectations based on the original Scope of Services, GTG was very flexible in adjusting to our needs during the process. They were very responsive in address questions even after they completed their engagement with us.

If I can provide any further information or assistance, please contact me at 217.403.8970 or e-mail me at fred.halenar@ci.champaign.il.us.

Sincerely,

Fred Halenar
Information Technologies Director

November 6, 2006

Subject: Letter of Recommendation for Geographic Technologies Group

To Whom It May Concern:

Geographic Technologies Group (GTG) has worked closely with the City of Midland, MI to help build a successful GIS program. GTG completed a needs assessment and three-year phased implementation plan for the entire city. They were also responsible for the design and development of our base map and utilities data, integration with the city's HTE database, and deployment of custom GIS applications for all city staff.

While working together, I have been consistently impressed by GTG's job performance and dedication towards their work. GTG has exceeded our expectations and have been essential in the quick success of our GIS program. The City of Midland went from virtually no existing GIS to an enterprise-wide GIS serving all city staff in less than a year. This would not have been made possible without the highly skilled and professional services of GTG.

I highly recommend GTG without reservation to any organization seeking professional GIS services. Please do not hesitate to contact me if I can provide you with any further information.

Respectfully,

Anthony P. Foisy

GIS Manager
The City of Midland
333 W. Ellsworth
Midland, MI 48640
(989) 837-3368
tfoisy@midland-mi.org

Campbell County
wyoming

October 11, 2006

Mr. David Holdstock
Geographic Technologies Group
648 North Spence Avenue
Goldsboro, NC   27534

Re: Professional Reference

To Whom It May Concern:

Campbell County, Wyoming would like to submit this letter of recommendation for Geographic Technologies Group (GTG). In September 2004, the Campbell County Board of Commissioners awarded a contract to GTG for a three year – phased GIS Strategic Plan. The professionalism and expertise of the entire GTG team became readily apparent to all of the stakeholders as we moved through the comprehensive interview process.

We are halfway through the cycle of the plan, and I am very well pleased with the progress we have achieved thus far. Sheriff's deputies have rugged laptop computers in their vehicles with GTG's GeoBlade Crimes mapping application. Parks and Recreation, Sheriff's Office, Assessor's Office and the Library have public information kiosks for their customers with GTG's GeoBlade Map Touch software. GeoBlade Address is an easy to use GIS overlay which the Building and Zoning Department use to keep the new address point layer up to date. And all county employees have access to the GeoBlade intranet mapping solution to quickly access and view county GIS data.

In addition to the software solutions, GTG has provided monumental achievements in database design and integration, with a logical and physical database design which have recently been integrated and migrated to an ArcSDE database. Their team of data experts also helped Campbell County create and scrub essential GIS layers such as a street centerline layer and the address point layer.

To top it all off, the technical and support staff add yet another layer of professionalism to the overall GTG experience. In under two years, Campbell County has gone from having no GIS to having a world class enterprise GIS, and it would not have been possible without the dedication and commitment we received from the entire staff of GTG. I give Geographic Technologies Group my highest recommendation possible to anyone considering utilizing their talents.

Sincerely,

Cathy Raney, GISP
Campbell County GIS Coordinator
307.687.6297
clr23@ccgov.net

The mission of Campbell County is to provide quality, efficient, and cost-effective services for all Campbell County residents through sound decision making and fiscal responsibility.

A.71

CITY OF
FOLSOM
DISTINCTIVE BY NATURE

David Holdstock
Geographic Technologies Group
1202 Parkway Drive
Goldsboro, NC, 27534

Subject: Professional Reference
Jan. 24, 2008

To whom it may concern:

This is a letter of recommendation for Geographic Technologies Group, Inc. (GTG).   GTG was awarded a contract to complete a GIS Strategic Implementation Plan. GTG exceeded our expectations by providing an in-depth and detailed document that we continue to use. Their methodology and presentation skills are second to none. Their technical team is very capable and can provide a wide range of services for a number of different platforms and applications. We use two of their software packages and are very pleased with the usability of the software, the excellent technical support, and the simple maintenance.

If I can provide any further information or assistance, please contact me at 916.351.3371 or e-mail me at rnavarrete@folsom.ca.us.

Sincerely,

Ramona Navarrete
GIS Analyst
50 Natoma St
Folsom, CA, 91630
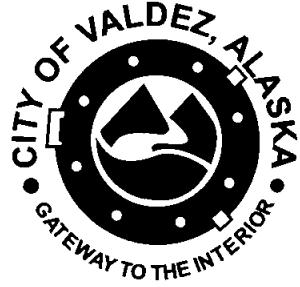
December 11, 2006

Mr. David Holdstock
648 N. Spence Avenue
Goldsboro, NC. 27534

RE: Professional Reference

To Whom It May Concern:

The City of Valdez would like to submit this letter of recommendation for Geographic Technologies Group (GTG). In November 2005, the Valdez City Council awarded GTG a contract to develop a three-year GIS strategic plan. As a strategic location for the United States the Department of Homeland Security recognized the need for City of Valdez to develop a geographic information system (GIS) and provided a grant that would support the City's disaster preparedness. The City viewed the development of a GIS as a critical decision support tool for all levels of the government. GTG's talented consultants understood our requirements and were able to develop a comprehensive plan that would establish an enterprise GIS in the first year of deployment.

The three-year implementation plan was completed in March 2006. Based on the quality of the plan GTG was selected to implement the plan and immediately went to work on fulfilling the plans recommendations. GTG is truly a full service firm dedicated to local government and within the first year will have accomplished all the goals set forth in the implementation plan including a significant level of data development. The project management skills and professionalism exhibited throughout this partnership has been second to none. In the face of adversity they have taken ownership of the process and succeeded in delivering the highest quality work under short deadlines and at itmes with limited input from the City.

In addition to the data development initiatives, GTG has provided software tools and data management solutions that establish a platform that will support GIS interoperability. In less than two months GTG developed critical base map data and prepared it for integration with the City's new e911 system. GTG has demonstrated a deep understanding of how, why, and where GIS should be used to maximize efficiency. GTG's professionals have become valued and trusted resources for the City of Valdez. I would personally and professionally recommend GTG to any organization that wants an honest and pragmatic partner in developing or enhancing an enterprise GIS. I am excited about working with GTG in the years to come.

Sincerely,

Chris Farmer
Director of Information Technology
City of Valdez, Alaska

October 30, 2006

David Holdstock
Geographic Technologies Group
648 North Spence Avenue
Goldsboro, NC 27534

Subject: Professional Reference

To Whom It May Concern:

I am pleased to offer this letter of recommendation for Geographic Technologies Group, Inc. (GTG). The City of Pearland, Texas has had an extremely successful working relationship with GTG since 2001.

With the increasing pressure for automated information systems such as GIS and field data capture tools the City of Pearland decided to award a contract to GTG to provide a complete GIS needs assessment, feasibility study, database design, assessment of IT infrastructure and a three-year implementation plan. The plan addressed departmental structure and size, hardware and software and all existing and future activities relying on maps and databases. A successful phased GIS implementation plan was developed and funding was secured. GTG also developed a plan and schedule for data conversion. The GTG team worked closely with all departments to implement an enterprise-wide GIS solution.

GTG's knowledge and experience make them the most progressive GIS Company in the United States. They are highly responsive and put the needs of the customer first which makes them unparalleled in the industry. GTG understands the needs of local government and offers a clear and concise return on investment. I would highly recommend the GTG team to implement GIS services for any city, county or town and its municipalities.

If I can provide any further information or assistance, please contact me at 281-652-1693 or email me at mmasters@ci.pearland.tx.us.

Sincerely,

Mike Masters
GIS Coordinator
City of Pearland

City of Blue Springs

903 W. Main Street
Blue Springs, MO 64015-3779

July 25, 2007

David Holdstock
Geographic Technologies Group
648 North Spence Avenue
Goldsboro, NC, 27534

Subject: Professional Reference

To whom it may concern:

This is a letter of recommendation for Geographic Technologies Group, Inc. (GTG). GTG was awarded a contract to complete a Three-Year GIS Implementation Services Plan for the City of Blue Springs, Missouri.

The City of Blue Springs has a tremendously successful working relationship with GTG, and they have continued to exceed our expectations by providing in-depth and detailed services for the City. GTG's knowledge and experience make them the most progressive GIS company in the Country. They are highly responsive and put the needs of the customer first, which makes them unparalleled in the industry.

If I can provide any further information or assistance, please contact me at 816.228.0119, or e-mail me at gporter@bluespringsgov.com.

Sincerely,

Gail D. Porter
The City of Blue Springs
GIS Coordinator
(816)228-0119
gporter@bluespringsgov.com

Richard M. Pollitt, Jr.
County Executive

Theodore E. Shea, II
Director of Administration

Edgar A. Baker, Jr.
County Attorney

James V. Fineran
Public Information Officer

July 3, 2007

David Holdstock
Geographic Technologies Group
648 North Spence Avenue
Goldsboro, NC, 27534

Subject: Professional Reference

To whom it may concern:

Wicomico County contracted Geographic Technologies Group to provide a Needs Assessment and a System Design, as well as a Phased Implementation Plan. The strategic planning document that ensued has developed a practical and detailed solution for both the County and the City. GTG presented its findings to our stakeholders, who could not have been more pleased with the outcome and the investment. Wicomico County and GTG have established a continued relationship through our software purchases and on-going technical support.

I would highly recommend GTG to any organization interested in expanding their GIS program. I can be contacted at (410) 548-4860, ext. 1661 or via e-mail at fmckenzie@wicomicocounty.org.

Sincerely,

Frank McKenzie
County Planner
Wicomico County, Maryland

Planning and Development Department	Post Office Box 99 Nags Head, North Carolina 27959 www.townofnagshead.net	Telephone 252-441-7016 FAX 252-441-4290

February 12, 2007

David Holdstock
Curtis Hinton
Geographic Technologies Group
648 North Spence Avenue
Goldsboro, NC, 27534

Subject: Professional Reference

To whom it may concern:

This is a letter of recommendation for Geographic Technologies Group (GTG). GTG has been assisting the Town of Nags Head with GIS products and services for well over five years. GTG drafted the Town's original GIS Strategic Plan and has been helping us to implement the plan ever since.

The Town has made great strides in GIS capabilities since the beginning of our relationship with GTG. Almost every Town employee with computer access can now utilize GIS technology made available through GTG's GISmo application. GTG's GeoManager product has proven to be an invaluable tool enabling the Town to build GIS data using information stored in a variety of existing databases. GTG's Staff has performed a number of GIS projects for the Town including water system mapping, creation of the Town's address point layer, and development of the Town's Online Mapping Service. GTG Staff has always provided timely, conscientious and value-added services. The Town's needs are always considered first and foremost and recommendations are always professional and unbiased. I would not hesitate to recommend GTG for future Town business or to outside GIS enterprises.

If I can provide any further information or assistance, please contact me at 252-449-6041 or e-mail me at garman@townofnagshead.net.

Sincerely,

Andrew Garman, AICP

Planner
Town of Nags Head, North Carolina

CALVERT COUNTY
INFORMATION TECHNOLOGY

Courthouse Annex
176 Main Street, Suite 102
Prince Frederick, Maryland 20678
Phone: (410) 535-1600 • (301) 855-1243
Fax: (410) 535-2181

Director
Joseph E. Klausner

Board of Commissioners
Gerald W. Clark
David F. Hale
Linda L. Kelley
Wilson H. Parran
Susan Shaw

October 30, 2006

David Holdstock
Geographic Technologies Group
648 North Spence Avenue
Goldsboro, NC, 27534

Subject: Professional Reference

To whom it may concern:

I am pleased to offer this letter of recommendation for Geographic Technologies Group (GTG). Calvert County Government has had an extremely successful working relationship with GTG since 2002, when the company was hired to perform a needs assessment for enterprise GIS and to develop a four-year implementation plan. We are now in the fourth year of that plan. With the ongoing support of GTG, GIS has become an invaluable tool for virtually all County agencies.

Unlike some other jurisdictions with which GTG has worked, Calvert County had no functioning GIS at the start of our relationship. GTG was able to provide the vision and plan necessary to achieve the goal of building a fully operational, mature GIS in four years. Today, the County boasts a GIS in which we take great pride. GTG's competence, evidenced in their knowledge of GIS science and industry developments and their understanding of user needs and expectations, has been critical to this outcome.

If I can provide any further information or assistance, please contact me at 410-535-1600 ext. 2307 or email me at obrienkm@co.cal.md.us.

Sincerely,

Kathleen O'Brien
GIS Coordinator

Maryland Relay for Impaired Hearing or Speech 1-800-735-2258

County of Wayne
State of North Carolina

GIS DEPARTMENT
Chip Crumpler, Coordinator

224 E. Walnut St.
P.O. Box 227
Goldsboro, N.C. 27533-0227
(919)731-1650
(919)705-1815

David Holdstock
Geographic Technologies Group
648 North Spence Avenue
Goldsboro, NC, 27534

Subject: Professional Reference

To whom it may concern:

This is a letter of recommendation for Geographic Technologies Group, Inc. (GTG). GTG was awarded a contract to complete a Geographic Information System (GIS) Strategic Implementation Plan. GTG has exceeded our expectations by providing an in-depth and detailed document that we will continue to use. GTG's knowledge and experience make them the most progressive GIS Company in the country. They are highly responsive and put the needs of the customer first which makes them unparalleled in the industry. Their methodology and presentation skills are second to none. Their team is very capable and can provide a wide range of services for a number of different platforms and applications.

If I can provide any further information or assistance, please contact me at 919.731.1650 or e-mail me at chip.crumpler@waynegov.com.

Sincerely,

Chip Crumpler
GIS Coordinator
Wayne County, North Carolina

2020 Hampton Street. Suite 3030
Columbia, South Carolina 29204
Phone: (803) 576-2017
Fax: (803) 576-2030

Patrick J. Bresnahan, Ph.D.
GIO

Mr. David Holdstock
Geographic Technologies Group
648 North Spence Avenue
Goldsboro, NC, 27534

December 11, 2006

Re: Reference for work completed

Dear Mr. Holdstock,

Since completing Richland County's original GIS Implementation in 1999, the County has engaged GTG on three successive updates to that plan. Richland County has been very pleased with the detail and professionalism exhibited by the GTG team during each of these projects. The Richland County has confidence in GTG staff abilities to meet with all department directors and senior staff in pulling together our enterprise vision. We have never been disappointed or let down by GTG and will continue to use your services as long as that remains the norm.

Richland County GIS has set a high bar with our program and feel confident in GTG's abilities to continue to assist us. On several occasions I have recommended GTG to a local government and will continue to do so.

If I can provide any further information or assistance, please contact me at 803-576-2017 or e-mail me at GIS@rcgov.us.

Sincerely,

Patrick J. Bresnahan, Ph.D.
Richland County GIO

April 20, 2011

The County of Brant
P.O. Box 160
Burford, Ontario N0E 1A0

To Whom It May Concern:

The County of Brant, Ontario retained Geographic Technologies Group to perform a countywide Geographic Information System (GIS) Needs Analysis and Strategic Implementation Plan.

The goal of this initiative was to identify a strategy for improving County business processes using GIS technology. The Needs Analysis assessed, evaluated, and made recommendations for many strategic, tactical, technical, and logistical issues facing the County.

Specific issues addressed included cost benefit, return on investment, training and education, data capture techniques, hardware and software procurement, budgeting, staffing and geodatabase migration were addressed.

The five year Strategic Implementation Plan made recommendations for system architectural design, governance, enterprise data management and system integration countywide data access, and public information access.

The Geographic Technologies Group was selected through an open competition. From the onset, it was obvious that the County had selected a leading full-service local government GIS consulting firm with significant depth of knowledge and experience in both GIS strategic planning and GIS implementation.

The GIS `road map`` developed by the Geographic Technologies Group was extremely comprehensive and easy to follow. The GTG team involved staff from every department in the process to ensure that the needs of every department were identified.

The County of Brant highly recommends the Geographic Technologies Group to any level of government considering the development of a GIS Strategic Plan or the implementation of a GIS system.

Bill Leonard
Project Manager
County of Brant
(519) 440-2451
bill.leonard@brant.ca

No User Left BEHIND

By Curtis Hinton, Geographic Technologies Group, and John Martineau, City of Rio Rancho, New Mexico

A city in New Mexico has transformed its GIS into an enterprise implementation in a relatively short time, aided by enterprise licensing. Located just north of Albuquerque, Rio Rancho has a population of 92,000. Like many other cities, Rio Rancho's GIS had developed in departmental silos, with Public Works and Development Services leading the way. After a decade of uncoordinated use, the city understood that GIS was becoming more instrumental to service delivery. Therefore, the city embarked on a strategic planning process with the goal of advancing and coordinating GIS enterprise-wide.

Late in 2012, the city promoted John Martineau to the role of GIS manager. At the outset, Martineau determined that he wouldn't be satisfied unless the GIS was doing everything that it could to advance service delivery in every department. He understood that GIS was not a standalone technology. His goal was to have GIS become the portal into all city data—spatial and nonspatial. The city partnered with Esri Gold Tier Partner Geographic Technologies Group (GTG) to achieve this goal.

Early in the project, it became apparent that the city's software needs had outstripped its licensing. Users were being educated about GIS, and the demand for access to GIS data and software was increasing rapidly. Concurrently, the GIS team was investigating ArcGIS for Local Government and ArcGIS Online as a means of disseminating information and functionality to the organization and the public.

An analysis of the financial commitment necessary to deliver the planned solutions prompted the city to enter into an enterprise license agreement (ELA) with Esri. Once the GIS team was no longer constricted by lack of software licensing, the expansion of GIS began in earnest.

Martineau insisted that enabling users

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No User Left BEHIND

By Curtis Hinton, Geographic Technologies Group, and John Martineau, City of Rio Rancho, New Mexico

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An analysis of the financial commitment necessary to deliver the planned solutions prompted the city to enter into an enterprise license agreement (ELA) with Esri. Once the GIS team was no longer constricted by lack of software licensing, the expansion of GIS began in earnest.

Martineau insisted that enabling users

with traditional GIS data was insufficient. His vision was to use GIS as the window into all of the city's technologies and data.

To that end, the city's GIS team worked with GTG to geoenable every dataset imaginable. Existing IT datasets were scrubbed and geoenabled. This included data from SunGard HTE (for licensing, permitting, utility accounts, 911, and police records), MicroPaver (for pavement management), Maintenance Connections (for work orders), RescueBridge (for fire records), and GraniteXP (for pipeline inspections).

In addition, the city's 1,800 scanned documents—engineering drawings, studies, reports, project files, and plans—were linked to their geographic location. Back end middleware was deployed to synchronize these systems continually so that data is immediately available within the GIS. All this data, coupled with more than 100 GIS layers, provides a wealth of information. Existing data was ported into the Esri Local Government Information Model (LGIM) so Esri maps and apps could be leveraged.

The challenge was how best to enable
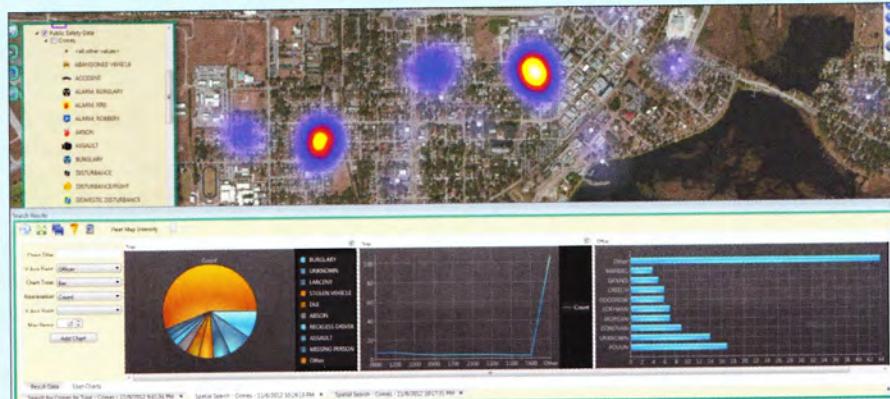
↑ Police Department Public Safety Analyst, an ArcGIS for Server-based app

users to consume and analyze all of this information. The city recognized that application deployment is where many organizations fail to realize the true power of GIS. After much planning, the city decided to implement a diverse collection of ArcGIS Online, ArcGIS, and third-party Esri-based apps. These apps were selected to meet the needs of three groups: internal users, city workers in the field, and the public.

Internally, a mix of applications was chosen. ArcGIS Viewer for Flex was deployed through eight targeted portals instead of deploying a single one-size-fits-all app that would not be the right fit for all Rio Rancho users. These portals were configured to meet the specific needs of user groups by configuring MapTips, data layers, and searches and linking to non-spatial IT systems.

Portals were deployed for the city clerk, city manager, code enforcement, development services, financial services, parks and recreation, public works, engineering, and public works utilities. This meant that departments no longer needed to consult various datasets to access the information needed. The result: decision making has been streamlined, time is being saved, and city staff members are more informed.

City of Rio Rancho staff members indicated they not only needed to have access to pertinent GIS data layers in the office but also access to this information in the field. This need was met by deploying mobile GIS maps to field crews. The city decided to use ArcGIS Online maps and applications to make this data available in the field. Staff members no longer print hard-copy maps or have to remember information they viewed in the office. Now they can access that data in the field.

The city deployed four mobile maps as part of this initiative. The mobile map for building inspectors contains two vital layers of GIS data for inspectors—parcel data and building permits. The engineering

← Public-facing ArcGIS Online portal for viewing active water leaks

↓ ArcGIS Online Field Viewer for Line Locators lets field-workers view the location of as-builts throughout the city and retrieve PDFs for specific as-builts.

→ ArcGIS Viewer for Flex portal for the city clerk

mobile application allows the engineering staff to view parcel data as well as record as-built drawings. Not only can staff view the area for each as-built, but they can bring up a PDF of the as-built while in the field to get more information.

The third application is for line locating crews. This application, similar to the
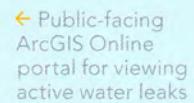
application for engineering staff, allows staff to view the location of as-builts throughout the city and to retrieve the PDF of that particular as-built. The fourth mobile application allows utility staff to view information from the computerized maintenance management system (CMMS) as well as sewer, water, and stormwater gravity main data.

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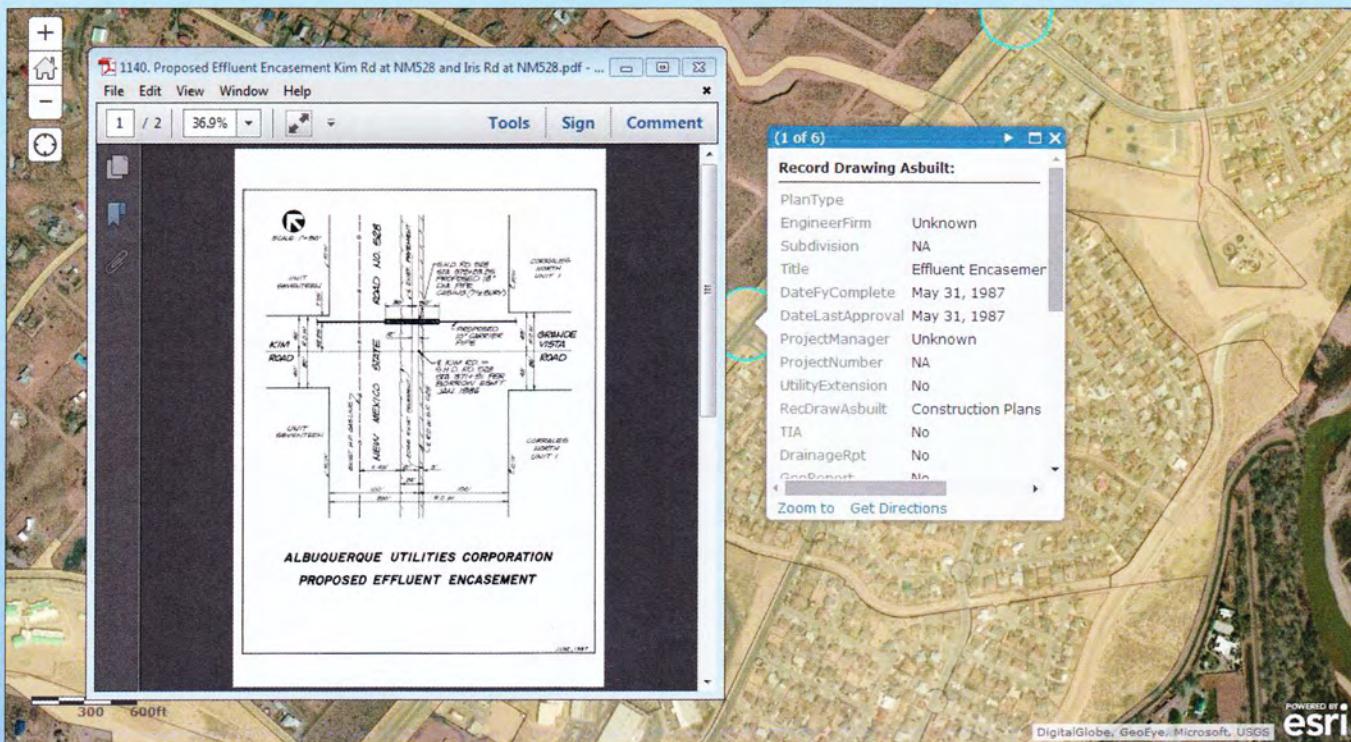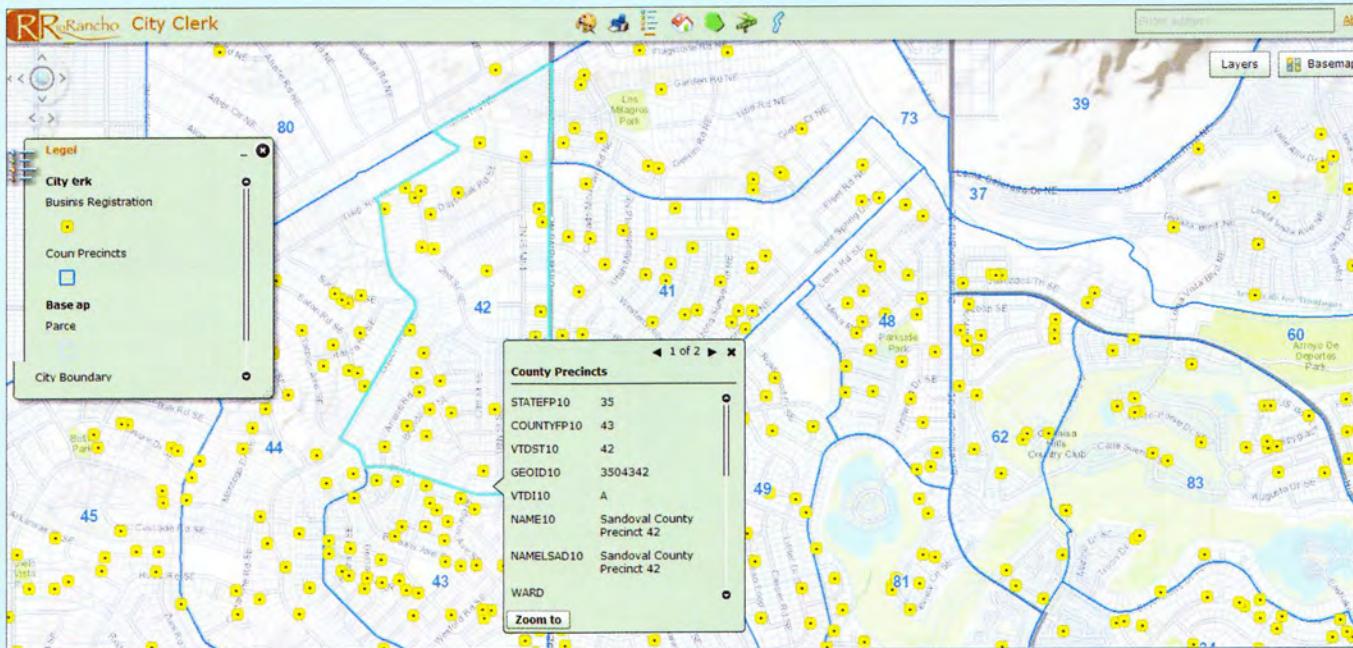
Public safety had needed to use specialized third-party products. GTG's Looking Glass Suite was selected for use in the 911 center, and police and fire departments. The 911 center had struggled for years with software that could not use live data with Esri GIS software.

Looking Glass Dispatch enabled dispatchers to track all active incidents, link building preplans and CCTV feeds, view live traffic data, and access any GIS data layer. The fire and police departments were enabled with Vantage Points Public Safety Analyst (PSA). PSA allows staff to view all incidents, do hot spot analysis and predictive analysis, and access executive dashboards that display live data.

Public safety wanted to use GIS in the field. To that end, the department deployed Vantage Points Mobile for their mobile data terminals (MDTs) and Vantage Points SMART for use on tablets and smartphones. Field staff can now view live GIS data, incident data, and the geolocation of vehicles and smart devices.

It was important for the city of Rio Rancho to provide GIS data and information to citizens through an easy-to-use GIS portal. The city deployed three GIS portals for citizens' use: one showing water leaks, another for viewing parcel information, and a parks and recreation area locator. Each app was built

using the ArcGIS Online apps the city could access with its ArcGIS Online organizational subscription.

The water leak map lets citizens view the location and other information about water leaks in the city. This data is derived directly from the water database using SQL statements. With the parcel map, citizens can view information about real property located in the city. Finally, citizens can use the parks and recreation finder to search for parks and amenities near their address, find out about city parks, and get routing information to parks.

The goal of most municipal GIS implementations is enterprise-wide adoption. Rio Rancho has achieved enterprise-wide success in a short time by focusing on user needs, identifying practical solutions, and leveraging the power of the Esri toolset. Plans are under way to continue expanding Rio Rancho's hugely successful effort with dataset development and implementing a number of other internal and external portals.

For more information, contact Curtis Hinton, president of GTG, at curt@geotg. com or 919-344-2169, or John Martineau, GIS manager for the City of Rio Rancho, New Mexico, at jmartineau@ci.rio-rancho.nm.us or 505-891-5054.

BY DAVID HOLDSTOCK

RETURN ON INVESTMENT
The Key to GIS Implementation

A.86
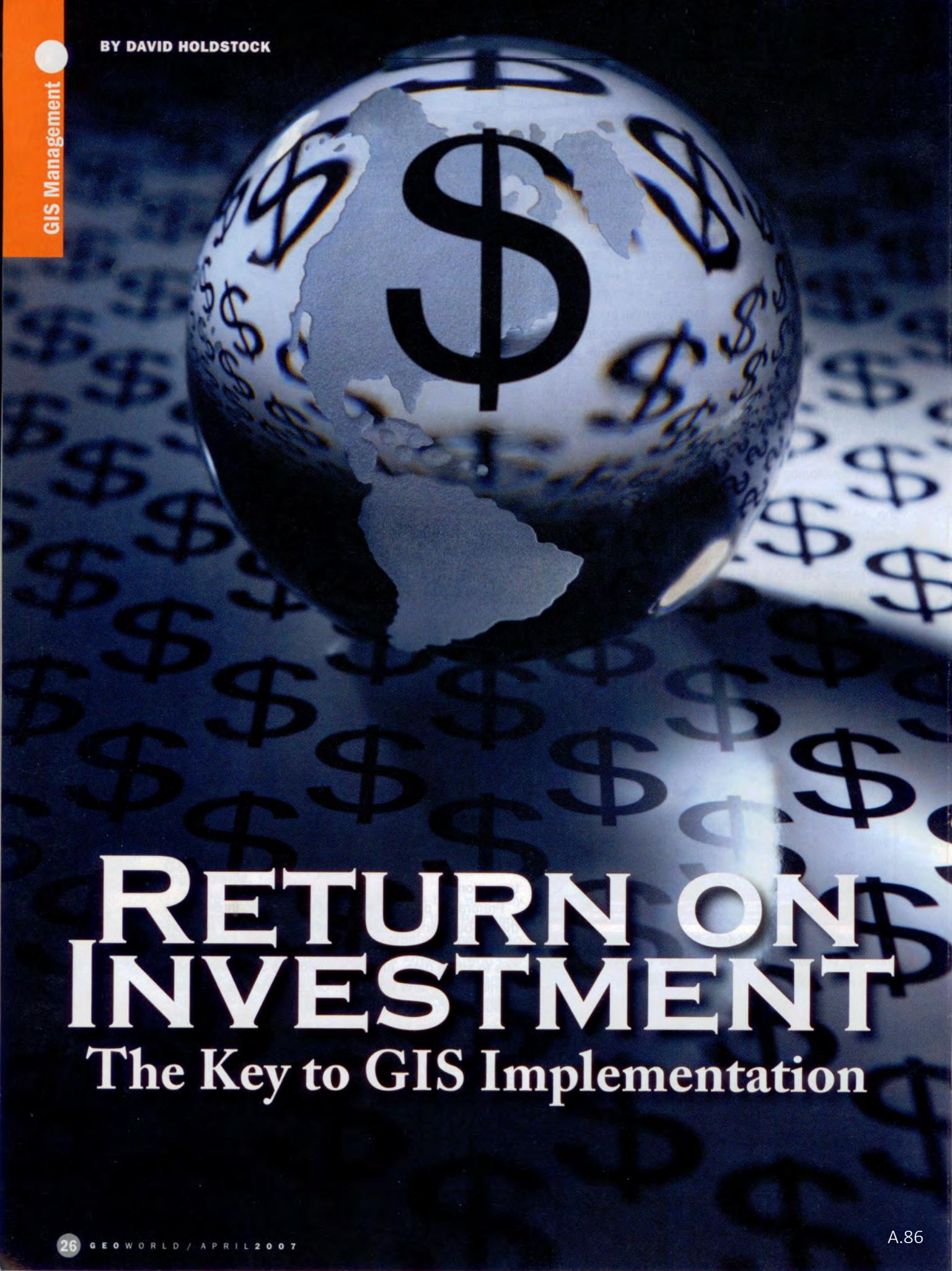
The benefits of GIS (also known as "payback," "return on investment (ROI)" and "value proposition") are maximized through careful planning, design and implementation—along with some coaching, cajoling and deft salesmanship. And all the components of a GIS should be in place and tested before trophies, rosettes and plaques are awarded for successes.

Remember, it takes more than a promise of significant ROI to make GIS a success in local government. But this raises the question: what's ROI?

Deploying a Compelling Technology
In the 1990s, organizations focused on deploying GIS because it was interesting and sophisticated technology. Some recognized that GIS would allow them to do new things and accomplish more in less time.

Local governments saw GIS as adding value, rather than reducing costs or saving money. Some organizations bypassed the strategic-planning process, but they realized immediate benefits. And for many, GIS was new technology for new technology's sake, implemented with "fingers crossed."

GIS strategic planning in the 1990s focused on the application and effective use of GIS, rather than on justifying the investment and developing a true business case that quantified ROI.

Evaluation before Implementation
No matter how technically compelling GIS appears to be, if the business case and payback aren't documented, and all components (see figure on page 28) aren't embraced, a GIS is flawed from the beginning, with diminished prospects for success. The approach to planning and implementation, however, is changing.

Organizations now focus on the strategic, tactical, technical and logistical issues of GIS. Specific components include the following:

Strategic Issues
· What's our vision for GIS?
· How do we define our short- and long-term goals and objectives?
· How will GIS enhance functions in our organization?
· What are our priorities?
· What pitfalls might we encounter?
· How can we use intergovernmental relationships?
· What obligations do other organizations have?

Tactical Issues
· What type of governance model should we use to manage the GIS: centralized, decentralized or hybrid?
· What type of GIS users should we have?
· What policies and procedures are needed?
· How will GIS enhance functions?

Technical Issues
· What type of GIS architecture is required?
· What type of data and databases exist?
· Which legacy systems do we integrate with GIS?
· Which skills are required?
· What options are there for maintaining and managing the GIS?

Logistical Issues
· Who should perform GIS duties and functions?
· Who manages the components of the GIS?
· What staff support and contractual services are needed?
· Can existing staff do some of the work?
· What are the costs?
· Could our resources better support the GIS?

Measurable Results
Although everyone in an organization has different daily concerns, they all share the same ultimate goal: results.

Elected officials may have little concern for functionality, but they want to know how GIS delivers a return on the taxpayers' investment and makes the community a better and safer place to live.

City and county managers focus on the governance of GIS and how best to invest resources to benefit all stakeholders. Clear lines of responsibility and accountability as well as the ability to measure results are chief concerns.

Information technology (IT) directors and GIS managers concentrate on the challenges of bringing the technology to users: designing GIS architecture, managing bandwidth demands, budgeting for software and server acquisition, and training personnel. For IT directors or GIS coordinators, the goal is to provide useful technology that immediately yields a high ROI at the lowest possible cost.

The following ROI opportunities are typically used in the strategic-planning process for local governments:

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SEVEN KEYS TO GIS SUCCESS

1) GIS MASTER PLAN
Careful planning ensures broad organizational commitment and adequate funding, and minimizes common road blocks. It serves as a guide for staffing, data standards, training, and hardware and software purchases.

2) COORDINATION
This is the most critical characteristic of successful GIS programs. Most organizations will need to evaluate and implement the optimum governance model for managing and maintaining their GIS.

7) QUANTIFY BENEFITS VS. COST
Proving savings in time, life, and money guarantees continued support and momentum. Make sure you invest resources on solutions that solve specific problems.

3) QUICK SUCCESS
The earliest phases of GIS are typically the most expensive and the most important, but the least glamorous. High impact projects that can be implemented in the first year help maintain enthusiasm and build credibility for GIS.

6) ENTERPRISE-WIDE IMPLEMENTATION
Spread the responsibilities for GIS throughout the organization and offer all departments the opportunity to use the technology. GIS should be as widely used as a word processor, on every desktop in the organization. This approach helps turn data into valuable information.

5) EASE OF USE
Gone are the days when GIS was limited to a few highly trained power users. Make sure you implement intuitive, easy solutions so everyone can benefit. Some of the most widely accepted GIS applications are delivered to the public via the Internet.

4) EDUCATION
Make sure users throughout the organization understand what GIS can do for them. Give users at all levels a preview of how they will soon be able to do their jobs more efficiently with GIS.

● The seven keys to GIS success illustrate the needed elements for sustained GIS improvements.

Saving Money

A GIS results in cost savings and avoidance. Immediate savings can be seen through better decisions and increased productivity. Cost avoidance becomes apparent as GIS helps organizations reduce and eliminate costs.

Saving Time

Having the information when you need and want it saves time, staff resources and money. Information can be made available to the public through a Web site or touch-screen kiosks in convenient locations, reducing demands on staff.

Increasing Productivity

Access to accurate, current information instantly saves the staff from having to waste time searching for lost data or trying to correct inaccurate data. Accurate digital and electronic GIS mapping can easily be accessed by and shared among all departments.

Improving Efficiency

GIS helps organizations reduce and eliminate redundant steps in workflow processes. GIS programs help reduce workloads and facilitate new procedures, resulting in increased productivity and efficiency.

Improving Data Accuracy

GIS creates maps from data. Paper maps can be digitized and translated into a GIS. Maps can be created on any location, at any scale, showing selected information to highlight specific characteristics. Precise GIS data enable users to generate accurate reports and produce quality maps instantly.

Making Better Decisions

GIS is a critical tool to query, analyze and map data in decision support. GIS can, for example, be used to choose a location for a development that has minimal environmental impact, is located in a low-risk area and is close to a population center.

Saving Lives

In an emergency, when every second counts, GIS can lead rescuers quickly and accurately to a scene. The time saved in locating a citizen can be the difference between life and death.

Automating Workflow Procedures

GIS helps automate tasks that expedite workflow and enhance the ability to react efficiently during a crisis. GIS can automate routine analysis, map production,

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data creation and maintenance, reporting, and statistical analysis.

Improving Information Processing

Enterprisewide GIS streamlines the flow of information throughout the organization, leading to better accuracy and access as well as increased efficiency in every aspect of the organization.

Complying with State and Federal Mandates

Digital inventories of water, sewer and stormwater infrastructure are becoming increasingly important in local governments. A complete GIS includes asset management, inventory control and depreciation based on accurate and timely data, including age, size and construction materials. This allows managers to predict and schedule repairs and replacements.

Protecting the Community

GIS helps public-safety officials develop emergency plans and respond to disasters more effectively. It also provides tools to monitor conditions, recognize threats, predict consequences, and respond effectively and efficiently to man-made or natural disasters. GIS also can help officials deliver information to citizens during an emergency, through emergency-notification systems and the Internet.

Improving Communication, Coordination and Collaboration

Good communication is the key to running an effective organization. GIS helps staff and elected officials convey complex information in easy-to-understand formats.

Delivering Data

GIS makes it easy to deliver information for complex political and regulatory requirements. GIS allows regulators and developers to consider all pertinent data, which results in informed decisions and better results.

Responding to Citizen Requests

With GIS data at hand, staff members can easily respond to citizen requests for information with maps. Maps are inherently easy to understand, and they convey complex statistics and graphs clearly and easily.

Improving Access to Government

Internet access to GIS information is the ultimate convenience for citizens, delivering information "24/7/365" that's accessible from their home or office. Staff then can help citizens with more complicated requests, resulting in increased customer satisfaction.

● **A mapping interface to the Decatur, Ill., police department's Computer-Aided Dispatch system is saving lives. In March 2006, assailants robbed a man, threw him in his trunk and drove away. The man called 911 from the trunk of the car, and the map interface, coupled with the cell-signal location, resulted in his rescue.**

Effectively Managing Assets and Resources

Effective management starts with analyzing, tracking, managing, allocating and conserving assets. GIS technologies make production and delivery quick and efficient, with maximum benefits.

The traditional approach to GIS implementation is changing. GIS is being folded into the IT department's operations and services, creating a more structured process for governance, management and "payback." Fewer organizations are bypassing the strategic-planning process.

Towns, cities and county government should embrace the key ingredients to success, understand the barriers to implementation, and, most importantly, establish measurable goals and objectives that illustrate and quantify a return on investment.

Author's Note: Geographic Technologies Group has developed case studies that correspond with each of the aforementioned ROI opportunities (see www.geotg.com/casestudies.html.) ⓖⓦ

David Holdstock is CEO and owner of Geographic Technologies Group; e-mail: *dholdstock@geotg.com.*

A.89

BY CURTIS HINTON

The GIS Holy Grail

Deploying Enterprise Solutions

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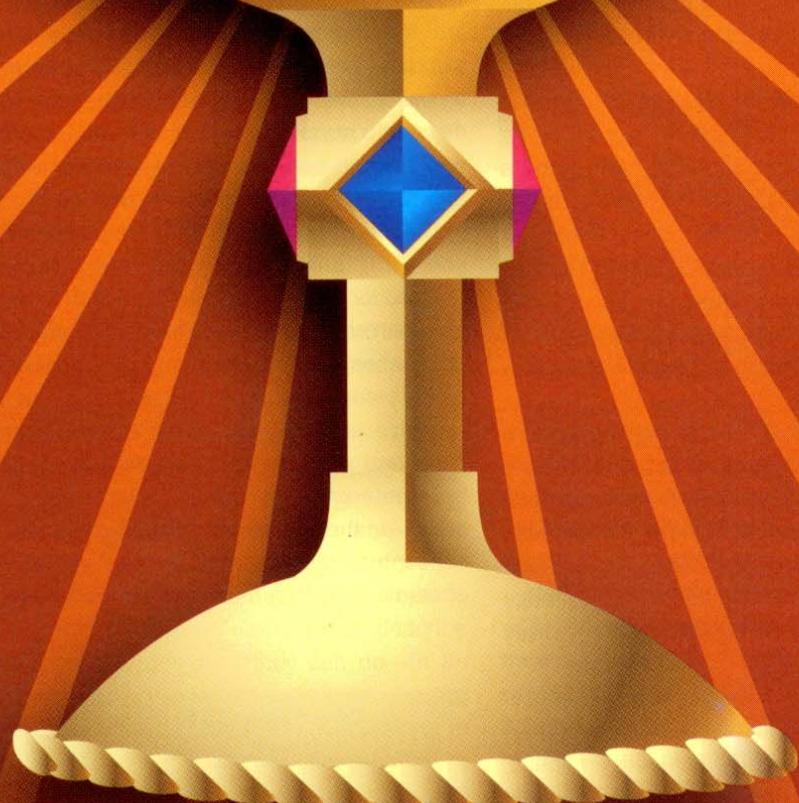
For years, local governments were sold on the enterprise benefits of GIS, and enabling the entire organization was the ultimate goal for most implementations. This goal, however, often was missed.

Historically, enterprise GIS has been the "Holy Grail" of GIS managers, who envisioned a world in which their users would be able to access the GIS investment through an intuitive tool that met their unique needs.

More than a decade ago, pioneering GIS professionals with dreams of enterprise GIS busied themselves in writing applications that used proprietary programming languages deployed via terminals tied back to a central Unix workstation.

Unfortunately, deploying these applications enterprisewide met with failure. Financially, it was too expensive, as each user typically needed to be licensed for a full copy of the GIS software (at more than $5,000). Therefore, rolling such applications out to casual users was cost prohibitive.

In addition, due to the relative lack of computer speed, the response time often was less than desirable. Early graphical user interfaces allowed for pull-down menus, pop-ups and other user-friendly tools, but the programming languages were limited. The resultant applications were neither elegant nor intuitive for non-GIS professionals (see Figure 1). The bottom line: enterprise GIS wasn't feasible.

PC Revolution

A little more than a decade ago, the GIS industry went through a major change. Unix workstations were abandoned for lower-cost PCs, which were gaining monthly advancements in raw processing power. Therefore, two of the hurdles to enterprise GIS were being overcome: affordable GIS computers and adequate end-user response times. This prompted a revolution in the GIS user experience.

Vendors, however, didn't immediately shake the use of proprietary programming languages. They moved existing programming tools to the PC environment, while introducing new PC-based proprietary languages. This model was problematic.

Students were graduating from college with sophisticated programming skills, but they knew nothing of these peculiar GIS programming languages. Therefore, GIS professionals, who often had non-programming backgrounds, were forced to learn to program in these languages. More often than not, this yielded inadequate results. Enterprise GIS still was only a dream.

Open Technology

GIS companies realized that they had to move away from proprietary and began embracing the programming languages developed for PC-based applications such as Microsoft Visual Basic. This allowed those with programming backgrounds to become viable candidates for creating GIS applications. The resultant tools began to look and function like other PC-based applications, providing a consistent user experience.

Early GIS toolsets, such as ESRI's MapObjects, helped create targeted GIS programs that functioned like the applications users were comfortable with. Also, they could be embedded within other enterprise applications—a major step forward.

The software could be deployed at much lower costs, because they didn't require a full GIS license for end users (see Figure 2). However, there still were impediments to total enterprisewide adoption. They had to be loaded on each computer, and updating programs became a major challenge.

Organizations began to demand that applications embrace the concept of the corporate intranet. Information technology (IT) departments began to move away from products that had to be loaded on each computer in favor of applications that ran via a Web browser. GIS on every desktop still wasn't a reality in most organizations.
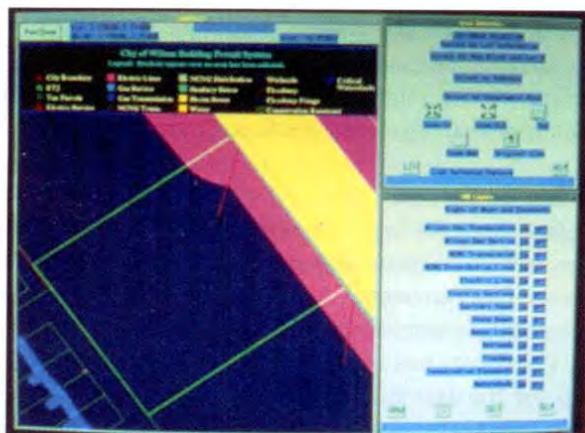
● Figure 1. A 1990s GIS application for the city of Wilson, N.C., shows a building-permit screening application written with Arc Macro Language (AML).

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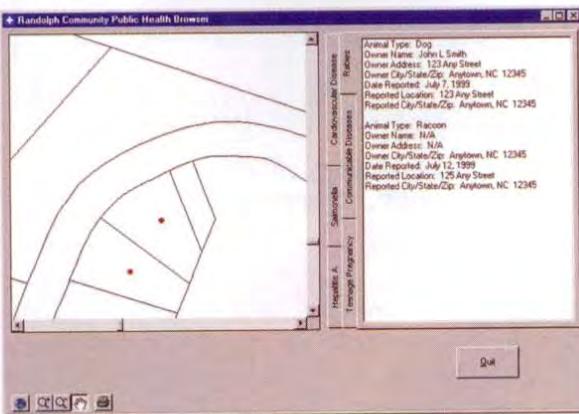
● Figure 2. A 2003 desktop MapObjects application was used by health departments to map and track information on diseases.

Web Interfaces

The GIS industry embraced the need to move to centralized solutions, and a host of new software products allowed GIS to be delivered via a Web browser. In addition, the programming languages deployed applications and updates easily to the entire organization and the public.

On the surface, it seemed that the GIS Holy Grail had been attained, but it wasn't wholly true. Applications could be made available to end users via Web browsers, but the programming tools didn't harness the full capabilities of GIS software. They made data viewing and

● Figure 3. An ArcIMS intranet GIS portal for Lexington, N.C., uses GIS and utility billing data.

some analytical capabilities available to the masses, but limitations soon surfaced.

The end-user experience often manifested itself as a generic portal that met the basic needs of many users, but fell short of specific needs of individual groups within an organization. The toolsets were limited and didn't embrace the full GIS capabilities of a flagship product.

Creative programmers did the best they could with limited toolsets, and many useful products were developed (see Figure 3). But users were becoming more sophisticated and demanding, and these toolsets didn't allow them to truly meet enterprise needs.

The GIS professionals were tasked to provide viewing, embedded and mobile tools as well as departmental functionality beyond generic portals. To accomplish these tasks, they had to create and manage Web-based solutions and a separate set of tools for mobile applications as well as harness the full flagship toolset. This resulted in a "hodge-podge" of solutions that were difficult to manage. Enterprise GIS had made major strides, but, for most organizations, still wasn't attainable.

Full Toolsets

Again, the GIS software companies recognized the limitations. Instead of providing loosely related toolsets that didn't integrate seamlessly with the flagship GIS, they created one common set of tools. This allowed GIS professionals to select needed tools ala carte, depending on unique user needs.

For example, ESRI's new ArcGIS Server allows GIS professionals to select scalable solutions that incorporate all levels of use within an organization. This one common toolset now can satisfy the browsing needs of casual users and the analytical needs of GIS professionals.

Centrally managed solutions now can be deployed for data browsing and editing as well as mobile users, and they can easily be embedded within other non-GIS software. Such tools can be managed from a central location using targeted applications with a common look and feel.

Enterprise Success

Organizations are beginning to realize true enterprise GIS use, and GIS is becoming ingrained in IT, like a word processor. Every employee with a computer now can access GIS solutions that allow them to do their job better.

"Our county has been working toward an enterprise GIS for the last four years," says Kathleen O'Brien, GIS coordinator for Calvert County, Md. "We have made great strides, but the new technology will allow us to target applications to meet the unique needs of diverse users.
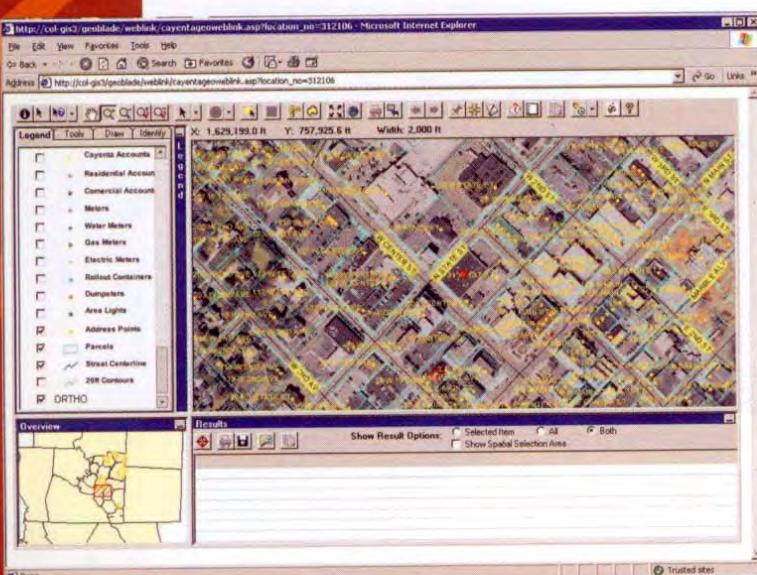
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"We are enabling the entire organization," she adds. "We know we are succeeding, because we have county staff utilizing GIS to do their jobs without having to become GIS professionals. What matters to users is that they now have a desktop tool that helps them do their jobs more quickly, accurately and effectively. User-friendly GIS has become another tool that is indispensable to the normal course of business."

Lexington, N.C., also has fully embraced the new tools, implementing ArcGIS Server as its core technology and creating targeted GIS portals for every department. The portals all have commonalities, but they're designed to meet the unique needs of each department (see Figure 4).

In addition, city workers are implementing field-editing tools that work in connected and disconnected environments. The datasets also are available to mobile users, and every city employee now has access to GIS.

Managing the configurations no longer is cumbersome, and GIS investments are being used in hundreds of different ways. The implementation also is seamlessly linked to other corporate software such as the city's financial/billing package from Cayenta, police-records data from OSSI and all other applications that contain geographically related data.

Keys to Success

Calvert County and Lexington achieved the GIS Holy Grail. Enterprise GIS no longer is a wish; it's become a reality for these organizations. But it didn't happen by accident.

Both organizations followed a strict step-by-step method to achieve success, focusing their implementations around the "Seven Keys to Successful GIS." The following keys incorporate critical implementation factors:

1. Have a GIS Mater Plan—Few successful enterprise GIS implementations exist without a detailed GIS Master Plan.

2. Have a Coordination Strategy—Organizations must identify people requirements. Who's going to manage the effort? Who's going to update datasets? Where do consultants fit in?

3. Show Quick Successes—Organizations must show successes early and often. Identifying and showcasing these successes often makes or breaks a project.

4. Educate the Organization—Formal training and informal education must be provided.

5. Implement Easy-to-Use Tools—If it's not easy to use, it won't be used.

6. Enterprisewide Implementation—This article
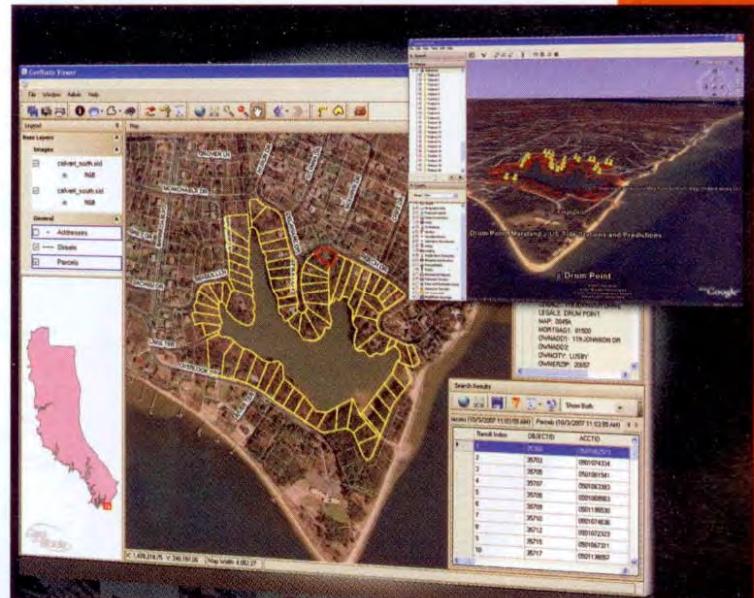
● Figure 4. An ArcGIS Server application can incorporate user data, launch external applications and interface with a variety of existing IT applications— with different views for each department.

focuses primarily on this critical component. To be a true enterprisewide tool, the following need to be achieved:

· User/department needs must be defined.
· Applications must achieve these identified needs.
· Tools embedded in existing IT applications must be implemented.
· Mobile and field tools should be implemented.
· Internet portals need to be made available.

7. Quantify Benefits vs. Costs—Without identifying the true benefits to end users as they compare to costs, many GIS implementations don't succeed. (For more information on this critical component, see "Return on Investment—The Key to GIS Implementation," *GeoWorld*, April 2007, page 26.)

GIS professionals have been seeking the enterprisewide Holy Grail for the last few decades without success. Fortunately, GIS professionals now can implement such solutions, which have a positive impact on their organization, community and world.

Curtis Hinton is CEO/owner, Geographic Technologies Group; e-mail: *chinton@geotg.com*.

A.93

Integrating technologies

GIS is critical to the true nature of an ERP. Geoenabled ERP solutions provide a single point access for interconnected data, enabling easy data sharing and analysis

David Holdstock & Curt Hinton

GOVERNMENTS AROUND THE world have to manage a variety of data and databases to serve the citizenry and to get their jobs done. This includes database administration and oversight of asset management software, billing, customer service, financials, human resources, and a host of other Information Technology (IT) tasks that are department-specific. No single software product satisfied all these diverse tasks. Therefore, separate software products were acquired for each. This resulted in a hodge-podge of systems that did not communicate or share data. Often data originating from one system was needed in another system. IT professionals were given the task of bridging the gaps from system to system. This required a high level of diverse programming and database skills. As new laws and ordinances

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affected these agencies, the IT professionals had to ensure that these unrelated systems met the ever changing needs of their agencies.

Innovative software companies saw the need to integrate these diverse tasks into one integrated application to facilitate the flow of information from one task to another. Many software companies began to create these integrated applications. The term Enterprise Resource Planning (ERP) was coined to describe these systems. IT organisations have begun to issue Requests for Proposals, (RFPs) for these integrated systems in an effort to streamline their operations and improve the customer experience. Shrinking budgets and shrinking staff has made it more and more difficult to employ the fleet of experts necessary to maintain the old model of patching together unrelated systems. Many government agencies have or are planning on acquiring an ERP system rather than paying for the maintenance of their legacy systems.

Running parallel to this new ERP mindset is a corresponding shift in how an organisation should view Geographic Information Systems (GIS). Historically, GIS was a technology unto itself. GIS professionals were hired to create, acquire, and integrate the data to meet the needs of the organisation. Many government employees erroneously saw GIS as computerised mapping. They did not understand that the true power of GIS was in its ability to take data residing in existing IT systems and give that data meaning. Government officials were turning to staff and demanding analytical information on such diverse questions as where are a majority of our customer calls/complaints coming from? Where do we need to be investing in additional infrastructure? Where are our current assets? Where are we spending tax payers dollars? Where are areas of public safety concern? and What do we need to do to prepare ourselves for the next natural disaster? Many of these questions could only be answered through GIS analysis of

Visualising the data on a map makes much more sense than presenting the data to the end-user via a computer-generated report or table.

the data residing in the existing IT systems. Creative GIS staff in tandem with their IT counterparts were able to access and geo-enable this existing IT data to answer some of these questions but only after untold hours of data mining and data scrubbing. IT and GIS professionals dreamed of the day when all systems within the organisation worked together. A time when GIS professionals could focus on doing analysis and not spending a majority of their time managing and massaging data from various sources.

ERPs have begun to bridge the gap of providing one source of interconnected data. For instance, a local government organisation can now view data spatially about a customer location, service calls at that address, building permits issued, historic occupants, code enforcement cases, and other data about a customer site through one portal. These ERPs have focussed on the data warehouse as the valuable asset and the application as a window into this wealth of data. Unfortunately, many ERP software companies have overlooked the most powerful data tool – GIS integration. It has been said that 90 per cent of all activity within government has a geographic component. That might be an address, parcel identification number, an x,y coordinate, or some other geographic identifier. Most ERPs house these data elements as fields within their databases. Unfortunately, some of these ERP software companies have overlooked the obvious – making their applications GIS-centric. In these cases, GIS professionals are still mining data in order to
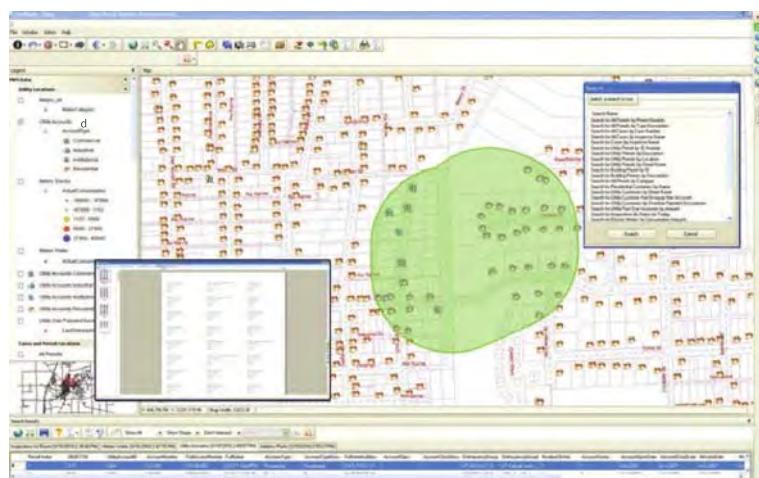
Figure 1: GIS connectivity model – ERP customer data available within a GIS portal

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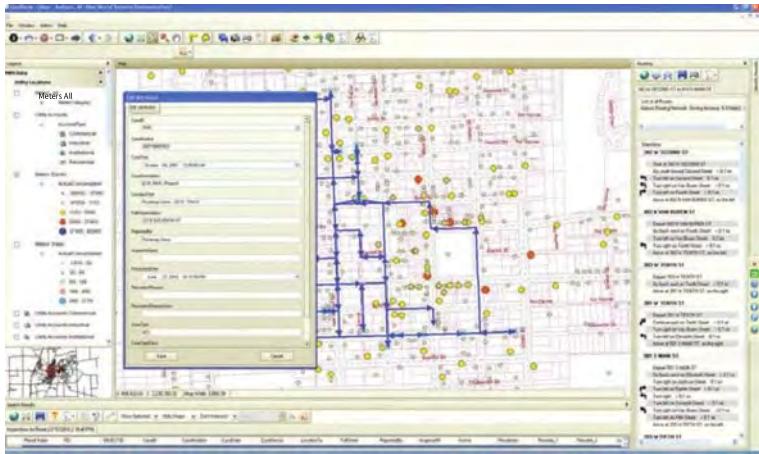
Figure 2: ERP work order interface with a daily route manifest

provide the geographic analysis. Visualising the data on a map makes much more sense than presenting the data to the end-user via a computer-generated report or table. Some ERP companies understood the importance of data visualisation and analysis, and have embraced GIS as a must-have feature in their software. This has been manifested in one of two ways – 1) GIS connectivity or 2) GIS integration.

GIS connectivity

Some ERP companies created GIS applications that connected to their databases. In these cases, the data entry and access screens for the ERP and the GIS tools are not related. The GIS application is written in such a way as to access and present the ERP data through a GIS viewing and analysis portal. Data being entered into the ERP was geo-enabled using backend tools that created connectivity between the ERP data and the GIS. In these cases, the users could view the data residing within the ERP as discreet GIS data layers. As Figure 1 depicts, a GIS user is presented with an interface that shows GIS layers in tandem with

geo-enabled ERP data such as utility customer locations, consumption data, and work orders. The user can then utilise GIS spatial analytical functions to make decisions about the data. This combination of ERP data and GIS has been a boon for governments. Questions that once took a group of IT and GIS professionals an inordinate amount time to answer can now be answered in a matter of minutes via the GIS portal. However, this model still has its limitations. A user can view data within the ERP but cannot affect changes within the ERP data itself.

GIS integration

Some ERP companies have moved beyond the connectivity model to a true integration model. In this case, GIS is interwoven into the ERP. A user can use the map as the data viewing, data entry, and data update portal for the ERP. Instead of being only a data visualisation portal, the GIS, in this case, is truly bi-directional. It can receive data from the ERP and it can push data into the ERP. This is much less commonplace in the ERP software arena. A majority of ERP vendors have implemented the GIS connectivity model. The integration model is much more complex and requires experts in GIS programming as well as experts in ERP programming. However, the end-user experience is much more robust and powerful. In the integrated model, the GIS and ERP interfaces are one in the same. A user can be manipulate data and see it via GIS whenever desired. Alternatively, the user can be manipulate the map/GIS data
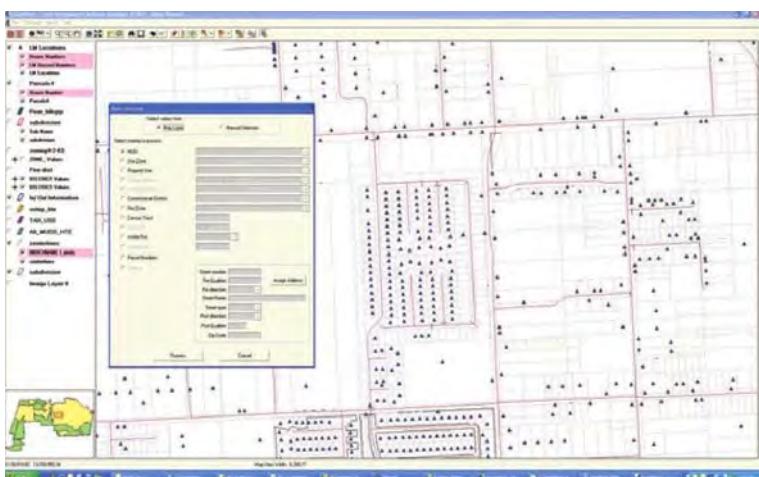
Figure 3: GIS interface for managing customer and address data with ERP auto-population

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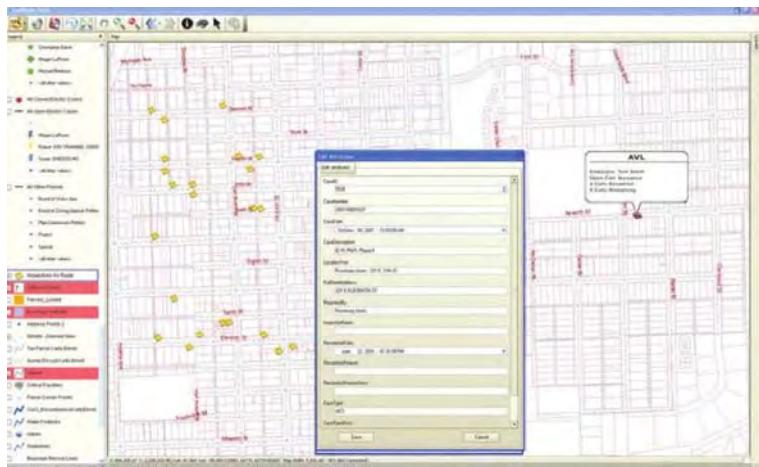
Figure 4: Mobile GIS/ERP work order interface with AVL support
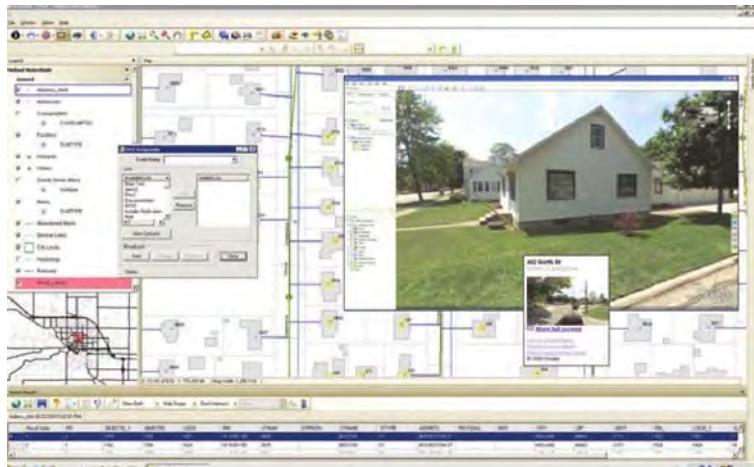
Figure 5: GIS as the One-Stop Portal – (ERP, Reverse Dialing, Google Street View)

The challenge for ERP vendors is to understand and appreciate that GIS is critical to the true nature of an ERP. ERPs were designed as a method of pulling disparate systems together under one interrelated software umbrella. Users are beginning to demand that their ERP software minimally incorporate the GIS connectivity model but preferably meet the GIS Integration model. ERP vendors will push this integration model to include not only traditional ERP data and GIS data but also diverse technology such as imaging, visualisation, reverse dialing, and other IT systems. The logical conclusion of these ERP efforts will be one portal to meet all the needs of the user. The most successful ERP vendors will not be satisfied with the current model but will push to create an end-user experience that brings all needed data under one umbrella. The logical culmination for the end-user will be a viewing experience that starts and ends with the GIS.

while interacting with live connected ERP data. Figure 2 depicts just such an interface. The GIS user is able to utilise GIS to manipulate an open work order. The user can create a route manifest (through the GIS interface) of work orders from the ERP. The user can enter work order notes and close the work order from the GIS without having to go to the traditional ERP data entry screen.

Figure 3 depicts a bi-directional interface in which a user is managing a GIS layer of addresses. As the user creates a new address, the GIS automatically does a GIS overlay

process to auto-populate pertinent fields within the ERP such as zoning, land use, voting district, and tax value.

The GIS/ERP integration is being taken a step further by some companies as they leverage the latest in GIS software technology allowing GIS and ERP data to be mobile. Figure 4 depicts a mobile GIS interface (using ESRI's ArcGIS Server Mobile tools) that allows users in the field to update ERP data from a GIS interface. Additionally, the user's field devices are GPS enabled so that managers can track the user's progress and location while in the field.

David Holdstock
GISP – CEO

Curt Hinton
GISP – President
Geographic Technologies Group

Geographic Technologies Group, Inc. (GTG) is one of the leading GIS consulting companies located in North Carolina, US. It has a tradition of deploying the best GIS solutions for the local government.

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BY DAVID HOLDSTOCK, CURT HINTON AND IRENE DEGROOT

ENABLING ERPs

Create a One-Stop Shop for Geographic Intelligence

A.98

In today's economic climate, tax revenues are dropping, budgets are shrinking, and local government information technology and financial departments are asked to do more with less. The need for true enterprise resource planning (ERP) software with integrated geospatial components has never been greater.

Despite the fact that many local government organizations are reluctant to change or purchase new ERP software due to the cost and impact of implementation, the town of Davie, Fla., examined the costs and benefits, and it committed to the next "wave" of ERP solutions with beneficial, integrated GIS functionality. The town is implementing New World Systems (NWS) Logos.NET software with integrated GIS functionality.

This article presents a real and present utilization of Geographic Technologies Group (GTG) Geo Blade software (designed using ESRI's ArcGIS Server and the mobile Software Developer Kit) integrated with the NWS Land Administration Logos.NET product. It examines the value of having the ability to use GIS to instantly access information stored in a large enterprise software solution. It also describes the benefits of enabling users to map, view, query, analyze and maintain information about permits, plan reviews, inspections, licensing, code enforcement, notifications and zoning. The usefulness of GIS technology also will be discussed for planning and zoning actions; land development; engineering services; water, sewer and stormwater infrastructure management; and modeling opportunities.

Geographic Intelligence

ERP software is designed to replace the departmental silo of information that's often a characteristic of local government organizations. The ERP is a central repository and backbone of data serving many departments. The data and databases stored within the land-based ERPs often include financials, billing, human resources, work orders and maintenance information, permitting, code enforcement, licensing, asset management, inspections, street paving and maintenance, citizen-complaint information, and document-management capabilities.

GIS is an information system that integrates, stores, edits, analyzes, shares and displays geographic or location information. It cartographically depicts information and allows users to create interactive queries, analyze spatial information, edit data, and present the results of all action and queries in an informative and cartographic way.
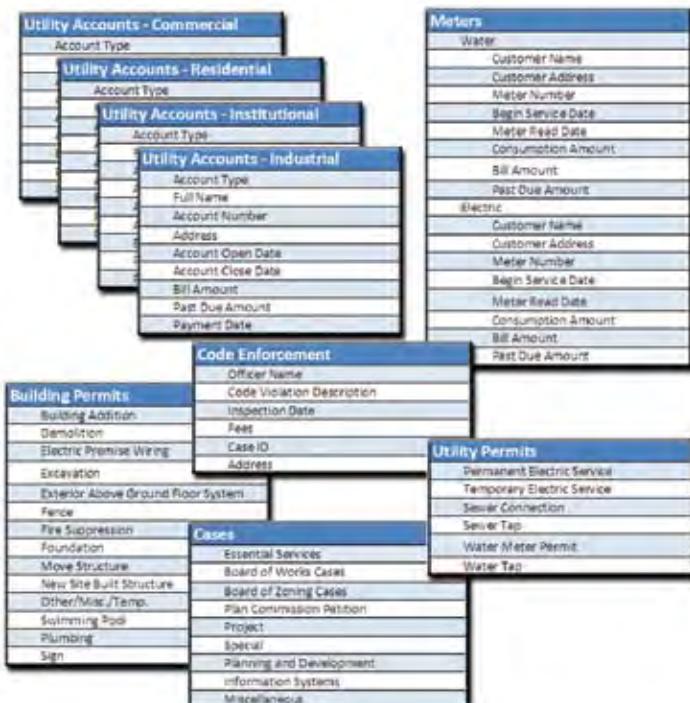
● **GIS SQL statements can automate ERP database searches.**

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During the ERP planning process, the town of Davie focused on how GIS would be seamlessly integrated with the enterprise database. What data maintenance activities would need to take place in the ERP and GIS? How would this new solution synchronize parcel and address databases? What would be important to visualize immediately? How much mobility or connected and disconnected editing would be required? What types of spatial analysis would be required? The answers to these questions are described in the following seven key success factors.

Key Success Factors

• **No. 1: Immediate and Informative Map Display.** The most important aspect of any integrated GIS is the immediate production of pleasing and informative maps. These maps need to tell a story without having to explain to users what they're looking at.

A simple and intuitive understanding of spatial patterns and simplistic but effective relationships of data is a critical ingredient in today's Google and mashup world. Large icons, colorful symbology and graphic artistry help create pleasing and informative mapping.

• **No. 2: Initiating Events and Bi-Directional Functionality.** Software is "GIS-centric" when an intelligent geographic interface allows users to initiate an activity that's typically stored in an external database. An example would be for a user to generate a work order, issue a permit or close out an inspection directly from a map on the screen. This is probably "information centric," but it's managed through the GIS interface. The goal is for the organization to have a "one-stop shop for geographic intelligence."
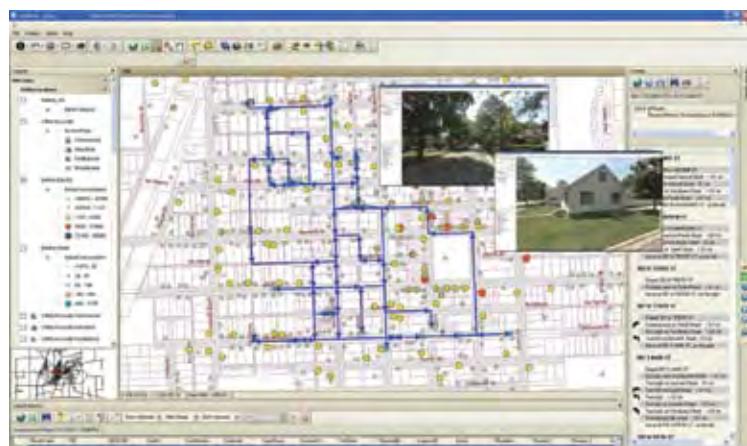
Key Success Factors

No. 1: Immediate and Informative
Map Display

No. 2: Initiating Events and
Bi-Directional Functionality

No. 3: Data Maintenance and
Address Synchronization

No. 4: The Spatial Analytical
Toolbox

No. 5: Mobile GIS

No. 6: The Public Portal

No. 7: Quantifying Value and
Return on Investment

• **No. 3: Data Maintenance and Address Synchronization.** Local government professionals need a tool that enables the synchronization of address databases, which are the backbone of enterprisewide GIS success. The town of Davie choreographed the development of a Parcel Address Synchronization Tool (PAST).

Synchronizing address databases from myriad sources is vital. The NWS ERP Logos.NET software solution has an address database that requires regular updates. The PAST solution compares the ERP address databases with parcel address changes, develops an exceptions report and allows users to interactively keep addresses up to date.

• **No. 4: The Spatial Analytical Toolbox.** A true integration of GIS with an ERP solution will offer users more than data visualization. Although a GIS empowers the organization, it doesn't satisfy the needs of ERP software users. And although the entire range of GIS functionality isn't required, a specific toolbox is required for integration to be a success. Routing and scheduling, querying and overlay analysis are important levels of required functionality in the GIS.

• **No. 5: Mobile GIS.** Local government is becoming increasingly mobile, and field professionals are relying more on mobile devices to view data and make decisions. The town of Davie GIS mobile software solution was designed using the mobile Software Developer Kit (SDK) solution and integrated with the NWS Logos.NET database. It also allows field staff to have connected and disconnected editing.

● **Code-enforcement officers can generate a daily stop-by-stop route of all addresses they need to inspect, ensuring the most efficient route possible.**

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Geo Blade ERP Mobile was developed around the Windows mobile devices and ESRI ArcGIS Server SDK solution. It allows users to go in the field and synchronize all spatial and attribute data with the ERP. It also allows GPS data collection and input into the ERP.

• **No. 6: The Public Portal.** The value of transparent government has been recognized and is an important part of the landscape. Information stored within the NWS ERP lends itself to public consumption. Geo Blade Citizen Web and/or a MapNimbus interface allow citizens to view information stored in the ERP. Permits, inspections, work orders and citizen complaints are a few examples of data citizens soon will be viewing through this portal.

• **No. 7: Quantifying Value and Return on Investment.** There's a growing awareness and dependency of government professionals and citizens to see spatial data presented as real and consumable information. The value of integrating GIS and ERP solutions is measured in the tangible benefits to the organization. Database visualization, mobile tools, address management, spatial analysis and sharing information with the public are core outcomes of integration. **GW**

● **Users can buffer around a particular parcel to generate mailing labels for all surrounding addresses.**

David Holdstock and **Curt Hinton** are CEO and president of Geographic Technologies Group; e-mail: *dholdstock@geotg.com* and *chinton@geotg.com*, respectively. **Irene DeGroot** is GIS manager for the town of Davie, Fla.; e-mail: *Irene_Degroot@davie-fl.gov.*

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BY IRENE DE GROOT, DAVID HOLDSTOCK AND CURT HINTON

Mobile Applications

FEMA/PATSY LYNCH

The Mobility of GIS

Geospatial Solutions Are Born of Necessity

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It takes a committed "band of professionals" dedicated to public safety and public service to be in a state of "disaster readiness." This band of men and women mobilize forces at a moment's notice, inventory, assess, clean-up and inform the public. It was Shakespeare who wrote in *Henry V*:

> *"But if it be a sin to covet honor, I am the most offending soul alive ...*
>
> *From this day to the ending of the world, But we in it shall be remembered, we few, we happy few, we band of brothers."*

When a hurricane rips through a community, the destruction left in its wake resembles a war zone. From the Carolinas to the Texas Gulf Coast, state and local professionals must be prepared to respond and recover from the destructive force of a major hurricane. With winds up to 156 mph and storm surges to 15 feet, roofs are sheered and entire cities are flooded. To make matters worse, debris fields consisting of a mixture of trees, signs, mobile homes, power poles, cars and boats greatly hamper or preclude the movement of emergency crews and displaced citizens.

In a mid-sized town in Broward County, Fla., one community recognized the potential to use modern technology to devise better ways to control the response and restoration efforts. The Department of Public Works and Capital Projects in the town of Davie is using the tools and technology normally utilized on the Capital Projects side and transferring these skills to the town's emergency managers. They hope post-event response and restoration efforts now can be managed as a large, complex construction project.

Mobile DART

At the recent 24th Annual Governor's Hurricane Conference in Fort Lauderdale, Fla., the public was given the first glimpse of the town's "Infrastructure Branch Plan." The presentation was given by a group consisting of two emergency-management consultants, two emergency-services contractors, a GIS consultant and the town staff. It was fitting that a group presentation was used to describe the plan, because a heavy reliance on cooperation and teamwork is its cornerstone. This detailed plan consists of two main components:

1. The pre-scripting of response and recovery actions.
2. The utilization of electronic project-management tools rooted in GIS.

Esri has become the de-facto standard for geospatial software for local government, enabling government organizations to use and benefit from geospatial tools for a comprehensive array of applications, including hazard mitigation. Esri also encourages and supports all its business partners who design and build solutions for hazard mitigation, sustainable communities, green technology, and effective and transparent government.

The Mobile Damage Assessment Resource Tool (MDART) is a new software application based on Esri technology that was designed and built by Geographic Technologies Group (GTG) in cooperation with the town of Davie. The product is coupled in real time with the Command Center GIS (CCGIS).

Developed using Esri's ArcGIS Server Advanced Enterprise Software Development Kit, MDART streamlines the process of inventorying and assessing damage; real-time uploading of field data with real-time statistics; and the important process of automated reporting to elected officials, the public and the Federal Emergency Management Agency (FEMA).

● **Damage assessments are quickly created in the field using mobile devices.**

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Mobile Mapping Technology

Most government organizations plan for dealing with indigenous contingencies. This planning process typically includes the development of a governance model, organizational structures, a basic operating process and intergovernmental cooperation.

Manny Diez, the Davie Public Works and Capital Improvement Projects director, guided consultant Helene Wetherington of Calvin, Giordano and Associates to develop the first comprehensive local Infrastructure Branch Plan in the state of Florida. He also worked closely with GTG to orchestrate the development of MDART and the CCGIS software solutions, which offer the following:

• An automated and electronic field inventory of damage, featuring easy-to-use GIS field tools.

• Real-time visualization and mapping within the Field Operations Center (FOC) and Emergency Operations Center (EOC) of the damage-assessment data collected in the field.

• A real-time "running tally" and assessment of the extent of the damage, including real-time progress tracking of field crews, built-in and automated cost-for-replacement calculations, and the CCGIS Dashboard Toolkit.

• Command Center incident response, decision making and immediate planning using information coming into the EOC from MDART.

• Streamlined and electronic reporting for FEMA. The speed at which an organization can assess and report the damage caused by a hurricane or other natural or manmade event is critical to the success of the recovery as well as reimbursement from the federal government. MDART and CCGIS products were born out of this need to streamline field processes and reinvent how organizations gather, report and analyze data.

• A transparent government toolbox featuring a mapping portal solution to make damage inventory and assessment data available to the public and media.

For many local government organizations, the damage-assessment task immediately following a disaster primarily is paper-based, time consuming, inefficient and costly. The business case for MDART and CCGIS was relatively easy to justify, as the field software's primary objective is to provide mobile, portable tools that allow EOC staff to electronically inventory the damage to all types of property (e.g., commercial, residential or infrastructure).

This mobile toolkit allows the Command Center to see the information in real time (as it's collected via wireless technology) as well as analyze impacts and make timely, informed decisions about resource allocations. The business case included strategic, tactical, logistical and technical reasons for implementation.

Strategic Decisions

Automating the historically manual processes of data gathering improves efficiency and reduces costs as well as allowing for the rapid visualization of the damage caused to a community. This, in turn, allows for improved decision making, better deployment of resources and improved reporting to the federal government. This opens the opportunity to improve transparent government via a Web-based interface for data dissemination.

Coordinating the recovery effort (including the damage assessment), along with mobilizing staff and resources for the clean up, is enhanced when data come into the FOC or EOC in real time. "Situational awareness" is dramatic, as real-time mapping shows where field crews are located, the extent of damage and the performance of field crews.

Technical Reasons and Logistical Solutions

There are many components to mobile field information technology, including the hardware, software (e.g., functionality, features, security and scalability), the network, and the data and database. MDART and CCGIS are designed and configured around these components for efficiency, effectiveness and overall performance.

GTG is developing a partnership with General Dynamics to offer the most suitable hardware for damage assessment. MDART and CCGIS software include the following:

• A flexible geodatabase solution
• An intuitive and easy-to-use dashboard
• Navigation system tools (real-time GPS locations)
• High customization

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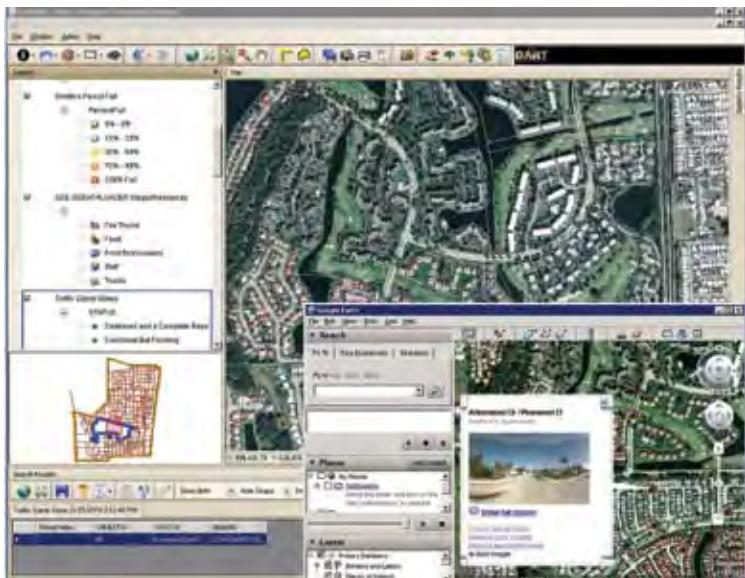
● Real-time field collections are seamlessly updated to the Emergency Operations Center.

- A simple but effective interface layout
- A rich user interface (check-box buttons, pull-down menus, Map Control toolbar)
- SQL query toolbox (canned and automated ad-hoc queries)

GIS solutions are a necessity for the FOC or EOC. The mobility of GIS coupled with office visualizations and geoanalytical tools offer a new form of "situational awareness" that's strategic and tactical.

A real-time running tally and progress report of the damage inventory, supported by a GIS dashboard assessment, is critical after a storm. It allows rapid incident response and immediate planning. Automated damage-assessment calculations and seamless reporting to FEMA have never been more in demand. **GW**

Irene De Groot is GIS manager, town of Davie, Fla.; e-mail: *irene_degroot@davie-fl.gov*.
David Holdstock is CEO, Geographic Technologies Group; e-mail: *dholdstock@geotg.com*. **Curt Hinton** is president, Geographic Technologies Group; e-mail: *chinton@geotg.com*.

● **Samples of the necessary FEMA reports show the required details.**

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BY CURTIS HINTON

BEYOND
Automating
Paper Maps

Utilities
Need a
Scalable GIS

The increasing demand and expectations of citizens, in addition to federal regulations, are forcing public-works and utility-services directors to find better ways to manage and maintain infrastructure. The increased performance expectations on these departments as well as concerns about liability allow GIS technology to be seen as an investment rather than a luxury. Public-works and utility directors now require a more strategic and tactical approach to adopting GIS tools, with a focus on how scalable geospatial tools benefit the entire organization.

Traditional utility projects focused on migrating system maps from paper to digital environments. The project impetus often was little more than "doing what we have always been doing, but now in a digital format."

The challenge faced by many GIS professionals is educating the organization on the power of the tools they have at their disposal. To add fuel to the fire, many early utility "GIS" projects weren't sufficiently planned and designed. These projects focused on mimicking traditional mapping efforts in a GIS, with the goal of printing out maps that looked exactly like hand-drawn maps.

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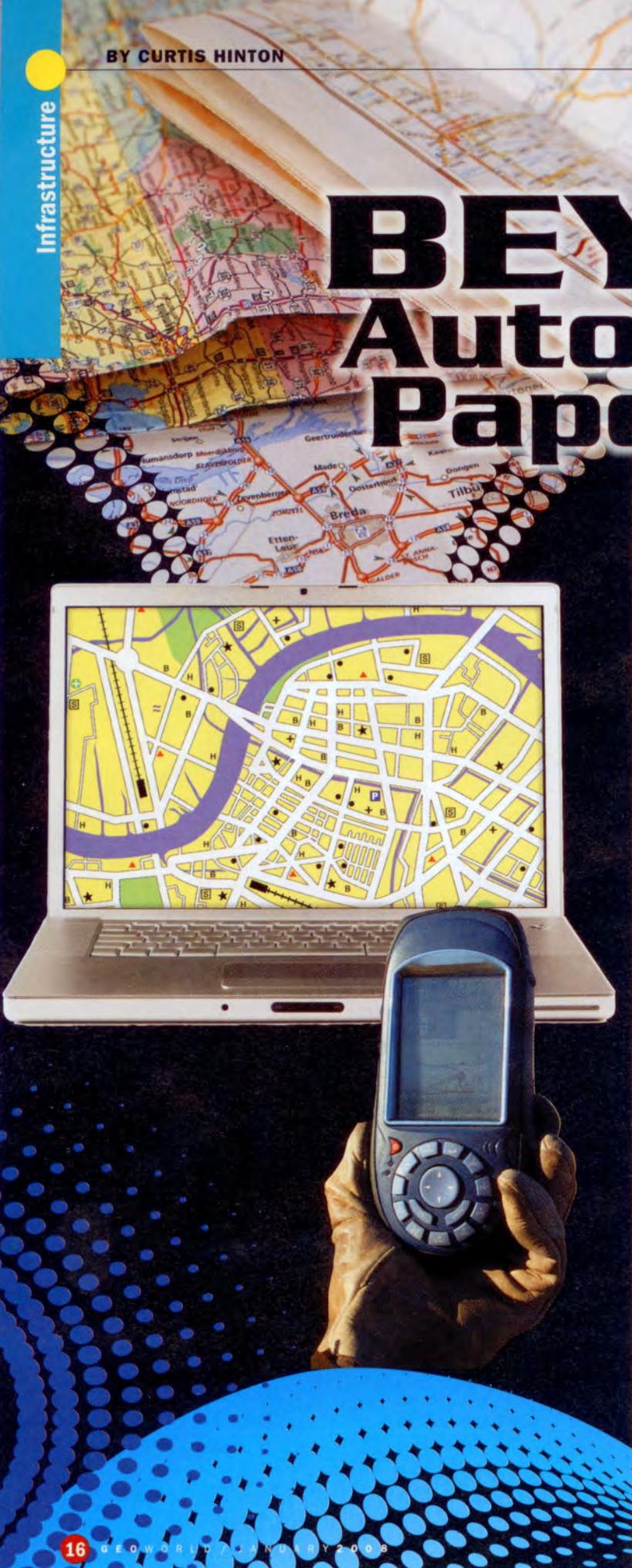
Often these projects were thin on database design, planning and defining how the end product would serve the organization beyond the map. In addition, many such automation projects began before the advent of geodatabases and design templates that ensure accurate GIS data.

Rethinking GIS

Dreams of predictive analysis, modeling and serving customers better were dashed by poor planning and design. This further complicated efforts, because many utility directors became jaded with the technology.

They had been sold on a technology that touted its ability to save large amounts of time and money. Instead, some felt like they were the butt of a bad joke, as the only result they saw was "doing what we have always been doing, but now in a digital format."

Now, however, utility and public-works directors are learning that using GIS to just create maps no longer is sufficient. The pressure to work more efficiently, make better decisions and satisfy various mandates (local, state and federal) requires the utilization of advanced GIS tools.

GIS professionals have been called forth from the back room to help solve the spatial puzzle. The time is at hand for them to implement GIS in a well-planned and organized way.

As with any industry, GIS professionals often find that it's better to mimic the successes of other organizations, and "re-inventing the wheel" is costly and fraught with potential peril. The following case studies highlight how various organizations faced their challenges and successfully implemented GIS to meet expectations.

Field Crews in Wilson

Like most cities, Wilson, N.C., was coping to meet stormwater regulations and be environmentally responsible, while balancing such needs with financial responsibility to its citizens. The city manages electric, gas, water, sewer and stormwater systems, and it began its GIS quest about 15 years ago.

The initial effort consisted of converting paper maps to digital format, leveraging the GIS tools available at the time. During the last five years, the layers for each utility were moved into a geodatabase and normalized through a formal database design and conversion. This allowed staff to utilize the technology for more sophisticated modeling and decision making.

"We just keep moving forward," says Will Aycock, Wilson's GIS director. "I'm proud of the fact that we have been a leader in the field, but I'm more excited about
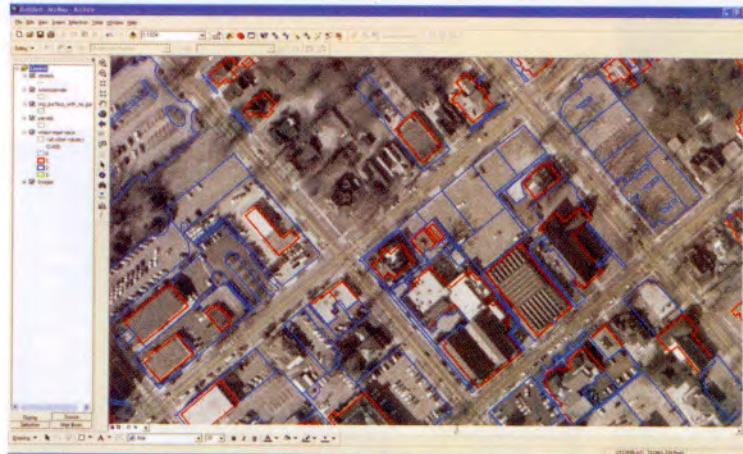
The city of Wilson's GIS features an Impervious Surfaces layer to estimate stormwater drainage.

what we will be able to offer our employees and citizens thanks to some new things we've put into place.

"We provide all of the utilities to our city and beyond, and our big focus now is pushing GIS capabilities to the field-service crews," he adds. "We've pushed customer information into the mobile unit, and it's helping all aspects of our operations."

Electric-service crews already are using the information to make decisions in the field, such as how to size a transformer without calling back to the office to speak to a customer-service representative.

"With a few mouse clicks on their laptop, the field workers can identify all of the customers assigned to a certain transformer and then identify the maximum demand for each customer in the last 24 months," notes Aycock. "That lets them know the correct size for the transformer. They can make the decision in the field, do the work immediately, and their decisions are correct."

It's a situation that ultimately benefits utility customers in several ways. First, customers waiting in a lobby to speak to a customer-service representative get faster attention when employees aren't tied up on the phone talking to co-workers in the field. And having access to accurate data ensures that crews can make repairs more quickly and effectively. Similar applications are being implemented for Wilson's gas, water and sewer functions, all using the same framework.

Recently, Phase II stormwater regulations prompted the city to implement a stormwater utility. Elected officials and city leaders required that staff develop

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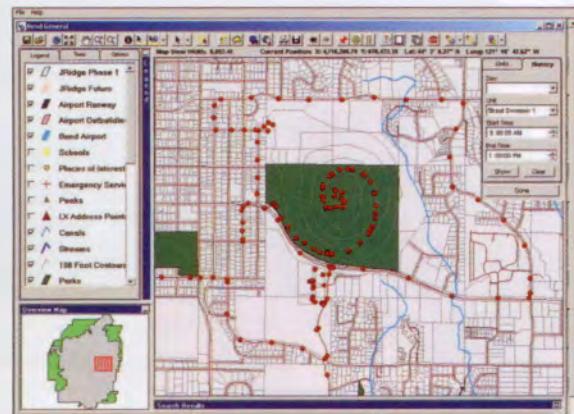
● **The public-works department in Bend, Ore., uses an automatic vehicle-location system to monitor snowplows.**

an implementation plan, and GIS played a major role in this effort.

All impervious surfaces were digitized from aerial photography. Tax-parcel GIS data were used in tandem with impervious surfaces to determine stormwater rates for every citizen and business in the city. Then the city had to integrate the new data with its utility billing system.

Overall, the implementation of a stormwater utility went smoothly. Staff leaned heavily on the GIS to answer questions from the public, such as how rates were determined. Staff also used GIS to show impervious-surface and rate-calculation methodology. GIS in Wilson now is more than a computerized map and has become the foundation of many city services.

Vehicle Location in Bend

Most of the challenges facing Bend, Ore., are the result of a situation most other cities would characterize as "a nice problem to have."

For the last few years, Bend has shown up on just about every "Best Of" listing imaginable. It's been recognized as one of America's best cities for doing business, one of the best places to retire and one of the best places on the globe to eat. Bend often is mentioned in a variety of magazines for its scenic location, great weather, moderate cost of living, strong economy and accessibility to outdoor pursuits.

All of the attention has brought thousands of new residents and visitors to Bend as well as pressure to move at warp speed to manage the growth and keep up with the demands of citizens and businesses.

Thirty years ago, when Steve Meyers, the city's information technology (IT) director, moved to Bend, the population was 15,000. Today, it's 70,000, and city building inspectors perform inspections at a rate twice the national average.

When Meyers saw GIS as an emerging technology several years ago, he immediately recognized that it would play a key role in the city's IT efforts. But he felt that the technology wouldn't be a good investment for the city until it became easy enough and affordable enough for "rank and file" employees to use.

Such a GIS would need to integrate with Bend's existing applications and tap into the massive database the city had accumulated through the years. As soon as GIS technology was introduced to city employees, however, Meyers began fielding a barrage of requests for expanded functionality.

"Our users would say, 'this is great, but it would be even better if we could do this,' and we're off to the next enhancement," notes Meyers. "Almost immediately, our staff began asking for GIS access to workers in the field. They wanted automatic vehicle location (AVL). The public-works managers wanted every driver to be able to send geographic data back from the field and use it to optimize their workflows."

Today, AVL is a reality in Bend. Devices were installed in all of the city's street sweepers and snowplows, which work year-round to prepare the roads for snowfall by spreading cinders for traction and clearing them afterward. For AVL, Bend uses an ESRI-based intranet GIS data viewer developed by Geographic Technologies Group.

"This is a major benefit for us, and not just so we can see where our equipment is," says Meyers. "We're going to be checking the speed of the vehicles, because we know the optimum speed is between eight and 15 miles per hour. We're going to be monitoring the temperature, so we can more efficiently use the de-icer to prevent ice, and we'll be able to see how much time each day the blade is engaged, because that has maintenance implications.

"I'm especially excited that our crews will be able to easily report problems that need our attention by clicking a button that will give our managers the

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exact coordinates of the problem," he adds. "We can evaluate if it's something that needs immediate attention—like a stop sign down—and take care of it."

Electricity in Lexington

Armed with a comprehensive GIS implementation plan, managers in the city of Lexington, N.C., had a major decision to make: where to begin.

The city could have started small and chosen an easy component of the plan for a "quick win." Instead, planners chose to begin with the most difficult, meatiest part of the plan: GIS implementation in the Electric Department.

"We knew mapping the electric system would be hard, because we had so little data in electronic format, and electric systems are, just by nature, very complicated to map," notes Sam Parcell, utilities director for Lexington.

"A lot of people were watching to see how well the project went," says Alan Carson, Lexington assistant city manager. "A successful start was key."

Brad Benson, city IT director, felt that the Electric Department was an ideal place to start. "We had a lot of gaps in information there, and a lot of the information we did have was in people's heads or, if we were lucky, on paper. Plus, there was so much enthusiasm for GIS in the Electric Department; they were eager to get underway. I wanted to capitalize on that momentum," he adds.

A big key for the city was to link the geographical data to its Cayenta customer-information database. Bobby Curry, city operations superintendent, said the technology was invaluable in Lexington's new initiatives with local co-ops, helping to see where the utilities' territories begin and end.

"When the information is there, you find ways to use it you never even thought of before," adds Curry. "The field work involved in data collection is extensive, but once you have it in your inventory, you can solve all kinds of problems."

Before the GIS project, basic tasks associated with adding new customers were labor intensive and expensive.

"If a business customer called and said they needed to have natural gas, electricity and sewer hookups to their facility, we'd have to send someone to do the research, mark the lines and develop a plan. Now, all that can be done instantly without leaving the office," says Carson.

● The city of Lexington, N.C., uses its GIS to automate services for electric utilities.

"With accurate data, you can do circuit studies and capacity studies on various wire sizes," adds Parcell. "We can determine whether we're using wire too small based on the loads. GIS is a great engineering tool."

GIS also provides Lexington Utilities with plant-accounting values that would be critical if the utility ever moved into the regulated environment and needed to seek rate approval from the North Carolina Utilities Commission. "Without the information we've just gathered, it would be impossible for us to show the investments we've made in our infrastructure," notes Parcell.

No longer can the industry be satisfied with using GIS as a manual mapping replacement. Organizations and customers are demanding that GIS help deliver better and more effective services. GIS professionals must lead the charge in making sure that the true power of GIS is realized and embraced. **GW**

Curtis Hinton is CEO and owner, Geographic Technologies Group; e-mail: *chinton@geotg.com*.

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BY DAVID HOLDSTOCK, CURT HINTON AND NANCY PETERSON

GIS AND THE DEADLIEST CATCH

A Famous Fishing Port Welcomes New Technology

About 800 miles southwest of Anchorage, Alaska, sits the fishing port where Discovery Channel films "Deadliest Catch." But gale-force winds off the Bering Sea, gusting to 120 mph, didn't stop city officials from visualizing the benefits of GIS.

GIS Technology for a Small Fishing Community
Top 10 Departmental Reasons for Implementing GIS

1 Infrastructure and Asset Management

2 Improved Workflow and Management of Work Activities

3 Accurate Mapping

4 Reliable Database

5 Work-Order Mapping

6 Regulatory Compliance, Permitting and Emergency Operations

7 GIS Analysis Capabilities and Modeling Integration

8 Improved Communication and Collaboration, and Customer Service

9 Natural-Resource Management

10 Cadastral Data and Ownership Information

Unalaska Island and Amaknak Island are part of the city of Unalaska, which boasts a strategic position in the North Pacific that's often referred to as Dutch Harbor, or just "Dutch" to newcomers. Dutch Harbor is the official name of the city's port and is located on Amaknak Island within the city limits of Unalaska. Almost all of the community's port facilities are on Amaknak Island.

The Dutch Harbor crabbing fleet is the feature of Discovery Channel's "Deadliest Catch" television show, which documents the events aboard fishing boats in the Bering Sea during the Alaskan crab season. Unalaska and the port of Dutch Harbor are the base of operations for fishing the North Pacific Ocean, which is rich in crab and bottom fish.

The small, yet bustling, city of Unalaska, with a resident population of 4,347, half living on Amaknak island and the other half living on Unalaska Island, has the added pressure of thousands of seasonal fishermen descending annually from all over the world to this small fishing port. This makes Unalaska unique, with special needs and priorities for technology.

An Enterprise GIS
After onsite meetings, interviews and round-table discussions, it became apparent that the emphasis on building an enterprise GIS solution would focus on infrastructure and asset management, including electric, water, wastewater and stormwater systems;

● A GIS demonstration helped visualize the city of Unalaska, Dutch Harbor and the surrounding area in 3-D.

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and parcel management. After the 2004 *Selendang Ayu* oil-spill disaster and the constant threat from the largely volcanic Aleutian range on which Unalaska sits, GIS is especially needed for emergency preparedness, response and recovery operations.

The accompanying table, "GIS Technology for a Small Fishing Community," page 33, documents the city department's uses for GIS technology.

The GIS initiative would include building accurate and reliable data layers, making such data accessible, integrating existing information systems, training and educating key staff, and possibly involving the Ounalashka Corporation (the local Alaska Native corporation and major land owner in town).

GIS and Visual Tours

Despite the high winds off the Bering Sea and the lateness of the hour, the city council, department directors and key city staff, as well local radio station KUCB, were presented with a 3-D fly-through of the city that enabled everyone to visualize what to expect from GIS technology.

Although the "pilot" was a novice at maneuvering through the landscape, up and over volcanic mountains, skirting "Bunker Hill," out to the landfill, over the processing plants and gently decelerating through the city's built-up area, the nature of GIS as a communication and database tool quickly became apparent. The GIS software used to model the terrain, landscape and built-up area will allow the city to view, query and analyze their attribute data in 3-D. Building floor plans, hazardous materials, building permits, videos and photographs all can be hot-linked to the digital terrain model.
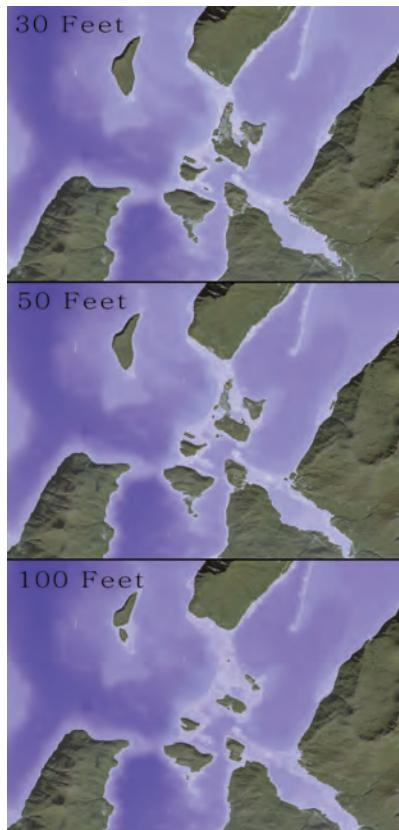
● A simulated tsunami scenario was created for the city of Unalaska, describing the effects in various areas.

Tsunamis and Oil Spills

The next incremental step forward in building a city-wide GIS would be to use 3-D modeling for tsunami mitigation, preparedness and coastal-community resilience. The GIS uses visualization techniques to forecast the inundation of sea-level increases and predict the impact of a tsunami. It may lead to modifying citizen involvement in preparedness, land-use changes, evacuation options and facility construction.

Oil spills are another real danger to the area. On Dec. 8, 2004, Unalaska witnessed the worst oil spill in more than a decade. The Malaysian freighter *Selendang Ayu* went aground and broke in half at Skan Bay off Unalaska Island. The accident caused 336,000 gallons of oil and 66,000 tons of soybeans to spill into the water and onto the island's shores. Six crew members died during a rescue attempt.

State and federal agencies attempted to minimize the damage and loss of life caused by the wreckage and spill, but hazard mitigation requires a comprehensive understanding of the natural and manmade environment. Incorporating bathymetry data, fisheries habitat, wildlife

● GIS can be effective in mitigation after a disastrous oil spill, such as the one that took place off Unalaska in 2004.

data and emergency predictive modeling into GIS technology can go a long way in mitigating a disaster.

Winds of Change

"The city of Unalaska is considering investing in a GIS," notes David Holdstock, CEO of Geographic Technologies Group, in a report from KUCB after the presentation to elected officials. "The system creates an interactive, digital map of the city and its entire infrastructure, including water systems, electrical systems and more. It forms a link between scattered pieces of information. The idea is that it will improve efficiency, reduce costs, and save time and money.

"The old classic story of the engineer who leaves the city with a wealth of knowledge—that knowledge won't leave the city," he adds. "It will remain in digital form even after staff leave."

Holdstock said that the GIS is useful for efficiently maintaining city infrastructure as well as for hazard mitigation plans in the case of a tsunami or a massive earthquake. The program, if approved, will take the city three years to fully develop, although parts of it will be useable much sooner. It will be up to the city council to determine what information would be available to the public. GW
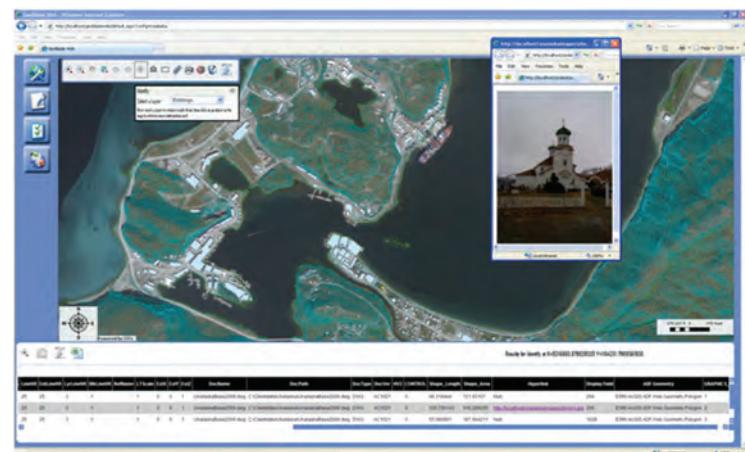
● An ArcGIS server Web tool would be an integral element of the city's GIS.

David Holdstock and **Curt Hinton** are CEO and president, Geographic Technologies Group; e-mail: *dholdstock@geotg. com* and *chinton@geotg.com*, respectively. **Nancy Peterson** is public works director, city of Unalaska; e-mail: *npeterson@ci.unalaska.ak.us*.

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BY DAVID HOLDSTOCK, CURT HINTON AND BERT SMITH

City GIS

An Island Sanctuary

Sanibel Designs a GIS around Conservation, Sustainability and Environmental Management

Green iguanas, Nile monitor lizards, Brazilian peppers, invasive exotic plants, sea turtles and maintaining water quality are a few challenges faced by the city of Sanibel.

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I ncorporated in 1974, the city of Sanibel is a barrier island just off the southwest coast of Florida. Located within Lee County, Sanibel Island is approximately 12 miles long and four miles wide.

It has a year-round population of nearly 6,000 inhabitants, but this number can swell to 25,000 in the winter—the prime tourist season. With an average temperature of around 75 degrees Fahrenheit, tourists from the north and Midwest come to Sanibel to escape the cold weather during the winter months. This influx of tourists adds more pressure to city services and puts a strain on the natural environment.

Turning to Technology

The ability of any community to balance the natural environment with man-made components is challenging. Sanibel's natural environmental system, including 17 miles of beautiful beaches and 26 miles of bike trails, contrasts distinctly with the built environment. Although Sanibel Island is a wildlife refuge, more than 60 percent of the island is actually protected wildlife preserves.

Therefore, the vision of this barrier island community is to sustain ecological balance as well as preserve and restore the natural setting for residents, visitors and wildlife. But where does technology fit into the city's overall vision?

GIS has emerged as a powerful and sophisticated means to manage vast amounts of geographic data for small communities as well as large organizations. This growth of GIS during the last 30 years can clearly be linked to technological advancements in computers, digitizers and plotters as well as an increasing demand for geographic information.

GIS provides the ability to collect, manage, manipulate, analyze and distribute data in map-based layers that provide a better visual image of location, patterns and relationships. This capability alone would help the city understand the island's nature and characteristics.

To fully utilize such technology, Sanibel retained Geographic Technologies Group to perform a citywide GIS Needs Analysis and Strategic Implementation Plan to identify a strategy for improving city business processes using GIS technology. The project assessed, evaluated and made recommendations for many strategic, tactical, technical and logistical issues. Specific issues such as software training and education, data capture techniques, hardware and software procurement, budgeting, staffing, and geodatabase migration were addressed.

Fulfilling a Vision

The city's GIS vision is to provide a high-quality system to empower users to manage and quickly obtain geographic data on demand. It's important to realize that the enterprise GIS project isn't just a technology deployment. It involves an interdependent set of components that, through careful orchestration, will lead

● A GIS will help preserve Sanibel Island's native species, which include the loggerhead turtle and green lizard.

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to a successful enterprise system. These components include the following:

- Coordination
- Data Standards/Procedures
- GIS Functionality
- Public Service and Customer Relations
- GIS Infrastructure
- Data Creation, Conversion and Maintenance

Each of these components contains specific elements themselves, and only through a coordinated effort will the vision be achieved.

● **The Brazilian pepper, Scaevola/Exotic inkberry and Lead tree are some of the invasive exotic plants prohibited on Sanibel. Such species will be tracked on the city's GIS.**

Coordination within the MIS Department

1. Enterprisewide GIS management
2. Leadership and management support
3. Identification, development and maintenance of knowledge skills for spatial data handling
4. Public service needs analysis and assessment
5. Strategic and tactical support for projects and programs

Data Standards/Procedures

1. Accurate, reliable and consistent geospatial data standards
2. Implementation of enterprisewide metadata standards, procedures and protocols
3. Documentation, archiving and indexing of geospatial data

GIS Functionality

1. Effective use of GIS
2. Defined tiers of GIS functionality
   A. Tier 1: GIS Flagship
   B. Tier 2: GIS Analytical
   C. Tier 3: GIS Browsers
3. Intergovernmental and public access

Public Service and Customer Relations

1. Improve efficiency and productivity, and enhance public service related to information containing geospatial data
2. Expand and improve public access to GIS

GIS Infrastructure

1. Technology: hardware/software/infrastructure
2. People: skilled personnel, knowledge base
3. Data: geospatial information

Data Creation, Conversion, Maintenance

1. Geographic data handling procedures to acquire, process, store and distribute GIS data
2. Conversion, integration, and standardization of disparate data from multiple sources and applications

GIS Implementation

A three-year GIS implementation plan was developed through information gathering, questionnaires and interviews conducted with the departments of the city of Sanibel. After extensive onsite interviews, meetings and telephone conversations, it was determined that the city of Sanibel has been using GIS in a limited capacity for several years in various departments, relying primarily on the Lee County GIS Web site. It now needs to move to a more integrated, scalable, enterprisewide implementation.

In addition, some of the critical elements needed for a successful GIS include enabling existing databases via

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an easy-to-use GIS front end; creating new GIS data layers and updating existing GIS data layers; converting existing maps in the Sanibel Plan to a standard GIS digital format; consolidating, centralizing and managing GIS data layers for use by all departments; creating user-friendly tools to access GIS efficiently and effectively; coordinating GIS efforts across the enterprise to improve effectiveness, reducing duplicate efforts and realizing an optimal return on investment; and making GIS accessible to all city employees and the public.

A majority of current GIS efforts are limited to Sanibel employees accessing the Lee County GIS Web site for data viewing, and the Department of Natural Resources is the only department actively creating GIS data. The Natural Resources Department uses GPS and GIS to perform the following activities:
  · Map invasive plant species
  · Track wildlife incidents (green iguanas, Nile monitor lizards)
  · Map water quality

The city of Sanibel has invested in software and associated databases. Using GIS as a window into these databases will improve Sanibel operations and allow a significant return on investment from these existing products.

In addition, Sanibel will consider a server-client enterprise GIS based on ESRI ArcGIS Server mapping technology and consider using the ESRI Enterprise Licensing Agreement rather than purchasing individual software licenses.

A survey of all networking, hardware and software resources throughout the city indicates that computer resources and network infrastructure are good. The city will consider investing in two new servers to implement the ESRI ArcGIS Server technology. It also will consider upgrading PCs to accommodate high-end GIS applications and additional software installations.

Sanibel will continue to work closely with other GIS professionals at Lee County, SCCY, J.N. "Ding" Darling NWR and Island Water Association, because Lee County has a large inventory of high-quality GIS data that are critical for Sanibel's GIS success.

The Sanibel Plan
GIS technology will help Sanibel adhere to the Sanibel Plan and preserve the natural habitat by giving Sanibel employee access to GIS data that will allow for the following:
  · Viewing current building-permit and code-enforcement cases
  · Viewing and analyzing historical building-permit and code-enforcement cases
  · Performing spatial analysis of relationships between development and ecological zones

● Sanibel is a "sanctuary island" located on the Gulf Coast of Florida, balancing an exotic natural environment with the city's technological needs.

  · Assisting with environmental-impact and water-quality studies
  · Viewing locations of wildlife incidents and invasive exotic plant violations

The ability of a community to use GIS technology to map, analyze and understand the balance of the natural environment with manmade components is evident within the city of Sanibel, and the strategic use of GIS technology is at the forefront. The city continues to use GIS and GPS to manage the natural elements of the island and protect Sanibel's diversity, beauty and uniqueness. ●

David Holdstock and **Curt Hinton** are CEO and president, Geographic Technologies Group; e-mail: *dholdstock@geotg.com* and *chinton@geotg.com*, respectively. **Bert Smith** is the Management Information Systems director at the city of Sanibel; e-mail: *bert.smith@mysanibel.com.*

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GIS for Public Safety: Are You Providing a Full Suite of Tools to Protect Your Community?

CURT HINTON, DAVID HOLDSTOCK AND CRYSTAL PHILLIPS-MUSTAIN, MGISc

Organizations can definitely save time, lives and property by using the right GIS data. This data checklist identifies some of the most critical GIS layers which should be pursued by every public safety agency.

As emergency service professionals, we are expected to do more and more to protect our community. As a group we continually rise to the challenge and understand that we have to ensure that we have the latest tools at our disposal to get the job done. We all hear the bad headlines when an organization fails to deliver expected service. For instance, recently a County in California dispatched to the wrong part of the County due to erroneous address information—response time was in excess of an hour. A community in Texas received a call and took more than 20 minutes in responding because they could not find the address. We all know that the press jumps on these stories and turns them into attention grabbing headlines. However, many of these problems can be avoided by ensuring that your agency has all of the needed GIS tools.

Public safety officials require comprehensive tools for effective emergency management. If public safety is to be realized—preparing, responding and recovering from natural and manmade events requires tools and techniques that have real beneficial applications. This article will describe some of the critical GIS data that should be available to all emergency personnel from the dispatchers to the first responders.

Routable Street Centerlines

Historically an address was located within a GIS by using a street centerline. A street centerline is a linear representation of the center of each street segment. Traditionally, each street segment is comprised

Address points and routable street centerlines.
Images courtesy of Geographic Technologies Group.

of information about the structure addresses that can be found along the street. So each street segment would have attribution detailing its address information such as street name, street type (i.e. RD, ST), pre-directions (i.e. N,S), post-directions (i.e. SW, NW) and address range (i.e. 100 – 148). To find a specific address, such as the location of a 9-1-1 call, the GIS software would compare an address to the street centerline file. The software would find the street segment that contained the address and mathematically interpolate the distance along the street segment to represent an approximation of where the address should be found. In most instances, this would reasonably close to the correct location. However, in the case of long roads, rural areas, un-evenly spaced housing and other anomalies this interpolation may locate the address well away from its true location. This presents unique problems that other GIS layers such as address points can resolve.

Another key use of street centerlines is vehicle routing, which requires that the street centerline layer contains additional attributes. Information such as one-way streets, overpasses, speed limits and turn impedances (i.e. no-left turn, anticipated slow-downs due to intersection configurations) are needed to get true results from a routable street network. Optimal routing is becoming expected in many public safety agencies. Many agencies only have street centerlines as they cannot afford to create and maintain address points. Therefore, having an accurate street centerline file will remain a bedrock public safety GIS layer for the foreseeable future.

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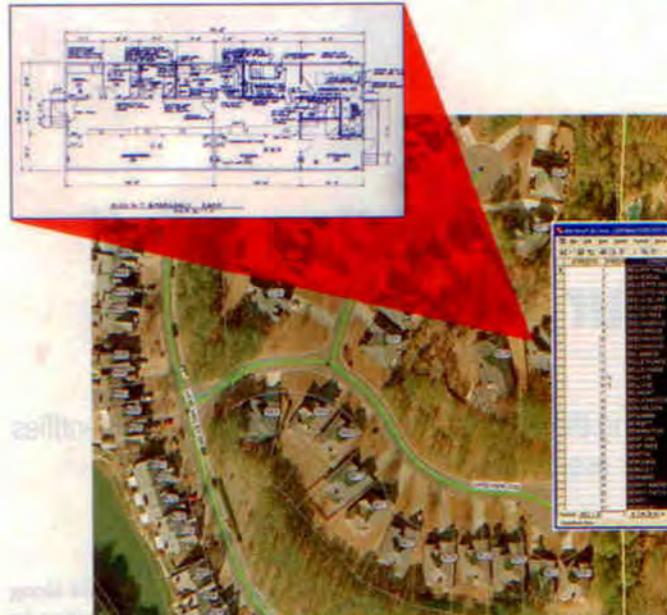
GIS allows for linking building pre-plans to GIS.
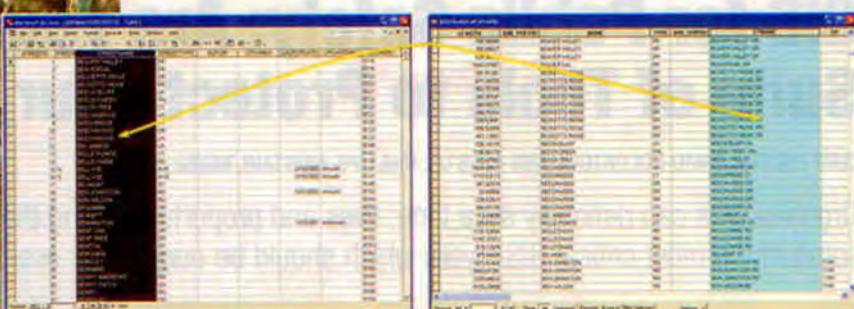
Comparison of MSAG data to GIS data for data correction and cleanup.
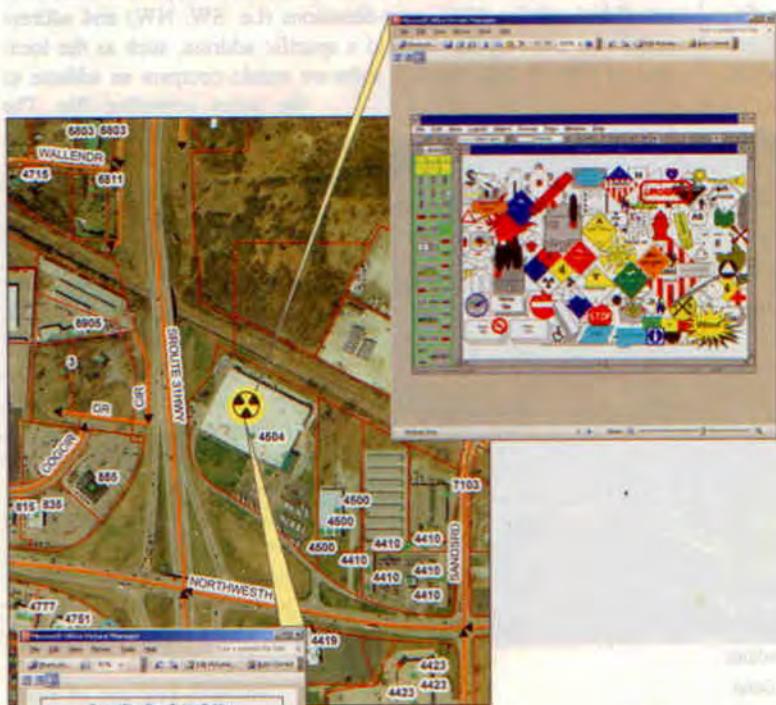
Tying hazardous materials information to GIS.

Address Points

Early public safety GIS applications relied exclusively upon the use of street centerlines to locate an incident. This served to get personnel in the right area of an incident but often failed to precisely locate the incident. Points would show on the map along the centerline and could be quite a distance from the true location. Strip malls, apartments, townhomes, rural structures and poorly addressed areas presented challenges and delayed the delivery of mission-critical services. This problem has been resolved through using GIS data points located at the precise location of the address. Now, GIS mapping tools zoom to the address point located on-top of or at the entry point of that address. Each individual unit in trailer parks, apartment complexes, strip malls and townhomes are tagged with their appropriate address. Hard to find single family dwellings are easily located via the address point. Even public telephones are being located to show the exact location of an incoming call. Optimally, these address points serve to automatically populate E9-1-1 geofiles and master street address guides (MSAG) eliminate duplicate entry.

Building Pre-plans

Most fire departments maintain a set of building pre-plans. These pre-plans typically depict the layout of the building, fire suppression unit locations, exits, etc. Fire department staff may visit and map out critical facilities such as schools, industries, hospitals and other large buildings to be referenced in case of an emergency. These pre-plans often exist as paper or stored on a computer in a drawing package such as Microsoft Visio. Often, when needed, the pre-plan is not readily accessible and therefore of limited use. However, enterprising organizations are linking these files to their appropriate locations within the GIS. Once done, the building pre-plans can be accessed within the dispatch mapping and mobile applications for immediate viewing.

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Hazardous Material Locations

An often overlooked yet very critical data layer depicts the location of hazardous materials. This is not only important for fire personnel but also police personnel as they are often first responders. Typically, fire departments house this data in a database or more typically in hard copy format. A GIS layer of the hazardous materials location should be created and made available. Scanning and linking the detailed reports of the hazardous materials is recommended.

Aerial Photography and Oblique Aerial Imagery

As the old adage says; "A picture is worth a thousand words." This is true with GIS. A wealth of imagery exists for a majority of the U.S. Traditional digital aerial images (ortho-photography) are available at most counties and/or municipalities. This traditional visualization has been augmented by commercially available satellite photography, new tools such as Google Earth and Microsoft Virtual Earth and oblique aerial imagery (allows a user a high resolution 360° view of an area). A mixture of these products are being used by agencies nationwide and should be made available to all public safety staff.

Critical Features Layer

Another layer finding popularity is a critical features layer. This layer depicts a host of features/landmarks for easy reference. Features such as schools, hospitals, critical facilities, government buildings and commercial establishments can be found on a critical features layer.

Reliable Data, Clean-up your Address, MSAG and ALI Database

Technology seldom works in solitude. For GIS tools to be effective they need data from various sources. We have discussed that address point data makes finding an address much easier. Additionally, this address point data allows an organization to sanitize their traditional address databases. Organizations rely on automated location identification (ALI) records from the phone company. The phone companies maintain a database of valid addresses in this ALI file. This file may contain data that is inaccurate and/or incomplete. Additionally, organizations have had to maintain a master street address guide (MSAG) that served as a way of validating an address into the E9-1-1 system. The MSAG file was often maintained manually and as such contained erroneous data. Often inconsistencies in these two datasets led to problems identifying a valid address. Now, organizations are using the address point GIS file to scrub the ALI and MSAG files. Once a comprehensive GIS address point file is created, it can then be compared to the ALI and MSAG files to identify mistakes and missing data. These mistakes can then be corrected. More advanced GIS addressing tools allow a user to automatically create and maintain the MSAG file obviating the need to maintain the MSAG file manually.

In closing, GIS has revolutionized public safety. Organizations can definitely save time, lives, and property
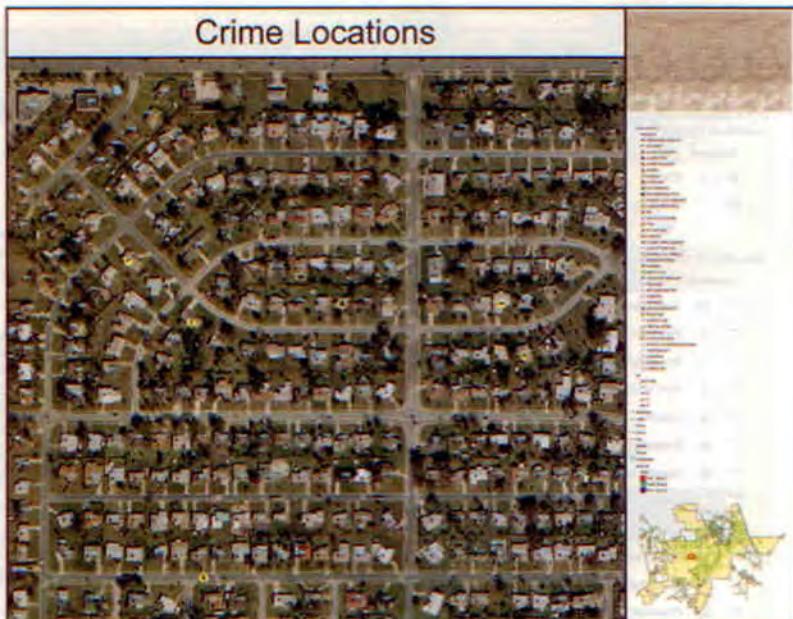
Aerial photography used in conjunction with GIS for visualizing crime.

Geographic Technologies Group

Understanding Local Government

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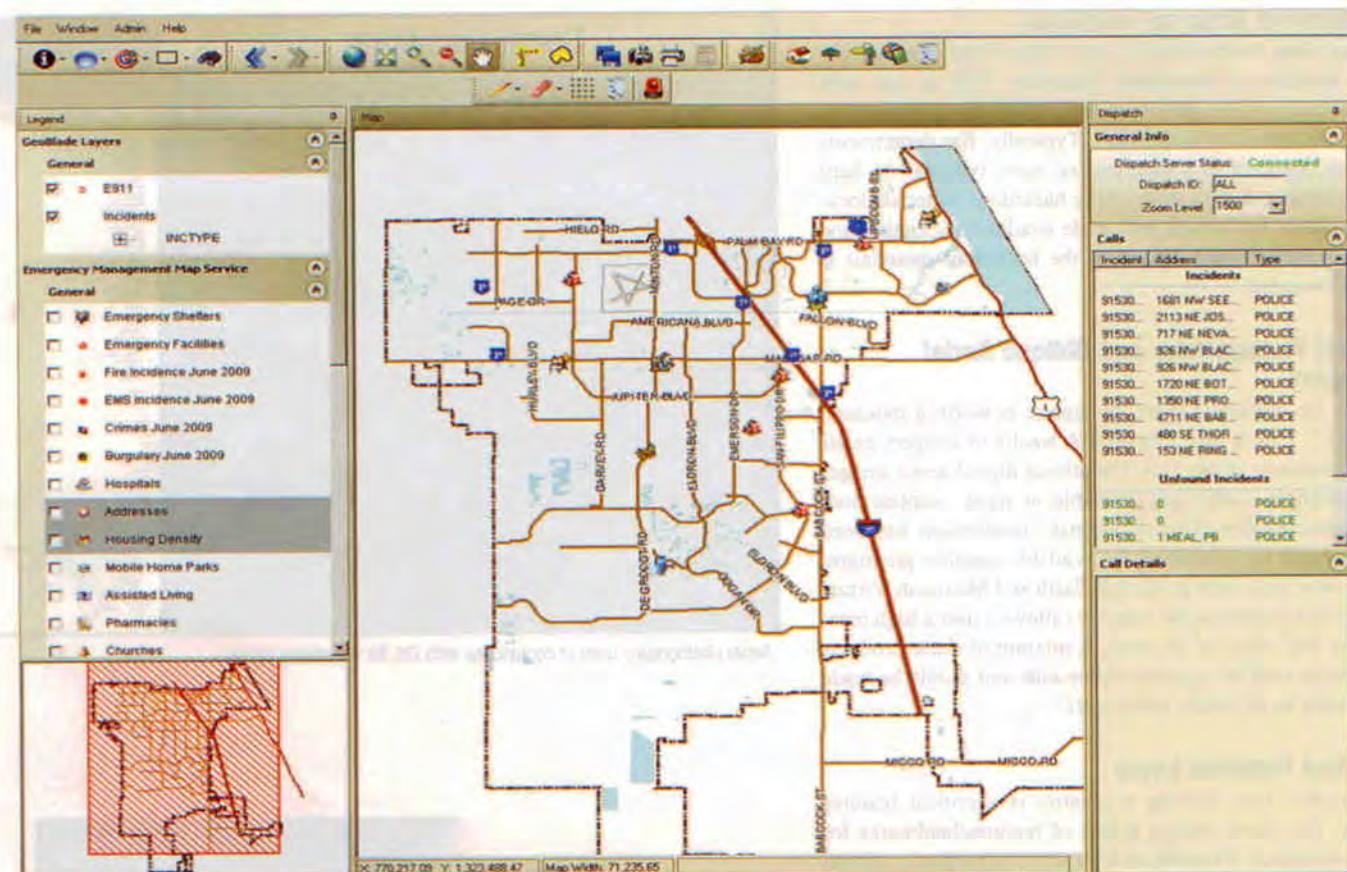
City of Palm Bay Critical Features GIS Interface for Emergency Management.
Image courtesy of the City of Palm Bay.

by using the right GIS data. This data checklist identifies some of the most critical GIS layers which should be pursued by every public safety agency. **ENPM**

Curt Hinton is CEO of Geographic Technologies Group (Goldsboro, NC) and former local government GIS Coordinator. As tenure as GIS Coordinator he led the City of Wilson to numerous national and international GIS awards. Curt speaks nationally on the topics of GIS for public safety and GIS implementation. He can be reached at (919) 344-2169 or via e-mail at curt@geotg.com.

David Holdstock is President of Geographic Technologies Group. He has been involved in more than 500 implementations of GIS for public safety agencies. His tenure as Research Director at ITRE

allowed him to work on hundreds of addressing and transportation related projects. David can be reached at (919) 222-1421 or via e-mail at david@geotg.com.

Crystal Phillips-Mustain, MGISc, is Enterprise GIS Division Manager for the Utilities Department at the City of Palm Bay. She holds a masters degree in GIS from the University of Minnesota and has 10 years of GIS experience. She built an enterprise GIS system for the City of Palm Bay and was awarded the Emergency Management Performance Grant to develop interactive mapping sites for emergency management. Crystal can be reached at (321) 952-3408 or via email at phillc@palmbayflorida.org.

GEOGRAPHIC TECHNOLOGIES GROUP®

UNDERSTANDING LOCAL GOVERNMENT

Computerized Mapping:
Boom or Bust? Are You Using GIS to its Fullest?

There are many challenges we must overcome in the public safety community in regards to mapping tools. Do not be satisfied with lesser GIS solutions.

■ CURT HINTON, GISP AND DAVID HOLDSTOCK, GISP

The pursuit of criminals and the betterment of public safety have been around for thousands of years. Both sheriffs and deputies are mentioned in the Bible. For thousands of years, the tools remained largely unchanged. Public safety personnel have always been looking for better ways to protect their communities. Before automation, first responders relied solely on their knowledge of the community. Emergency personnel had to rely on communication via the radio and their collective memory of the physical location of addresses. Solving crimes was left to the intuition of investigators. As the population grew, "knowing" the details of the local community became more difficult. Police departments relied heavily on wall maps with multi-colored pins depicting incidents. Filing cabinets containing endless reports were all that was available in determining trends. Identifying locations in the field depended heavily on information from citizens via the phone. Public safety officials did the best they could with the tools available to them.

Figure 1
GIS applications: one portal for all pertinent data.
Figures courtesy of Geographic Technologies Group.

Technology Advancements

The deficiencies of these methods, along with the advancement of computer technology, have led to a staggering array of tools that allow public safety staff to make more informed decisions. Of critical importance was improving the way calls for service were handled. 9-1-1 tools rapidly advanced to provide call takers immediate details of landline call locations. Since humans understand data presented in a visual context, it made sense to present the 9-1-1 calls on a digital mapping interface. By the 20th century, a majority of PSAPs had the ability to visually see all calls for service. As cell phone usage exploded, it became critical to know the location of the calls being received from the ever-burgeoning mobile community. Regulations were put in place to ensure that cellular carriers provided this location data. Phase I rules mandated that the mobile call could be identified to the closest cellular tower. Phase II rules mandated that the x, y coordinates of the mobile call were provided along with the call.

All Are Not Created Equal

Phase II compliant E9-1-1 centers have undoubtedly improved the safety of the citizenry. However, these tools are only as good as the geographic information system (GIS) mapping tools that display the data. It is important to understand that all GIS tools are not created equal. Many CAD vendors do not understand GIS. They know they need a computerized map, and they assign their programmers to make it happen. In some cases, this has resulted

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> Incident mapping has come a long way since the "pin map" hung on the wall. Digital incident mapping has become the norm.

in suitable solutions. In many others, the map interface is treated as an afterthought, and the end-user experience is painful. Some vendors have not embraced industry GIS tools as the starting point for their mapping solution. These solutions require that the organization convert their enterprise-GIS data to another format. This creates an undue burden on the organization and can result in map data that is out-of-date. As 9-1-1 software is upgraded, acquired or replaced, public safety officials should include their organization's GIS staff in the process. Most 9-1-1 agencies are not truly leveraging the GIS resources available to them. As addresses are added or changed in the enterprise GIS, they should be immediately available to call takers.

Unfortunately, most E9-1-1 centers have been sold mapping applications that accomplish only the most rudimentary tasks such as presenting the call on a street map. The modern E9-1-1 mapping application should be a window into all critical data. The application should map the call, display aerial photography, view oblique imagery and display critical public safety data such as hydrant locations, hazmat locations, building walk-throughs, live camera feeds, automated vehicle location (AVL), weather data and historic and current calls for service. All of this data should be read natively without conversion or delay to the end-user. The mapping application should be the portal to view all encompassing data. Organization officials should demand this type of

end-user experience. All too often the vendor states, "Yes, we have maps," and it is left at that. Ask the right questions, or bring in a 9-1-1 GIS consultant who can help you ask the right questions.

Mapping Tool Trends

Incident mapping has come a long way since the "pin map" hung on the wall. Digital incident mapping has become the norm. However, in a large majority of organizations, these digital maps are underdeployed and underused. Typically, a few staff members are designated as the crime analysts and are given the crime mapping tools. The crime analyst should have access to a set of high-end analytical tools. However, all staff should be able to quickly access incident records on an easy-to-use map for better understanding of what is happening in their area of concern. Intuitive pin mapping solutions should automatically show "hot spots" and all pertinent GIS layers. Mobile mapping solutions should allow officers in the field to view all of the critical data layers that are available to dispatchers. This is very doable for any organization. However, many public safety vendors do not truly understand GIS and how it should be leveraged as an enterprise-wide tool. Make sure that you understand what GIS can and should do. These powerful tools should be placed in the hands of all public safety staff.

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Figure 2
Public crime mapping: www.mapnimbus.com.

> Another trend that has recently emerged is enabling the public with mapping solutions that allow them to better understand the public safety concerns around them.

Another trend that has recently emerged is enabling the public with mapping solutions that allow them to better understand the public safety concerns around them. A few vendors have released viewing tools that give the public access to incident data and sex offender data for their community via the Web. These tools also allow end-users to sign up for e-mail notifications if a crime occurs within an area of concern (i.e. near their house, their child's school, a parent's house, etc.). This is just the beginning. In time, the public is going to continue to demand more information about their community.

There are a host of ways all public safety agencies should be using GIS, including:

- Mapping of all calls for service
- Mapping and spatial analysis of criminal activity, incidents and accidents
- Field access to geospatial data
- Mass notification system
- Internet crime mapping, including sex offenders
- Crisis management for schools
- Mapping homebound citizens
- Reverse 9-1-1 integration
- View and query existing infrastructure—water, sewer, gas, stormwater and facilities
- View and query utility customers
- Intranet site for quick PIN mapping
- Weekly PIN map
- Hot spot analysis
- Court case support for detectives
- Logistical support
- Tracking drug-free zones around schools
- Creation of new response areas
- Staffing analysis—what is happening when
- View aerial imagery for drug raids and traffic accident analysis
- Assisting in evacuation during storm events

- Laptop access with an easy-to-use data browser
- Traffic collision intersection studies
- Crime scene diagrams
- Track average speed of vehicles
- Know location of speed zones, survey zones, etc.
- Regional crime analysis
- Automated Vehicle Location (AVL)
- Plume analysis
- EOC operations
- Access to key data in a geographic context (weather data, building pre-plans, hazardous materials, critical facilities)

There are many challenges we must overcome in the public safety community in regards to mapping tools. First, do not be satisfied with lesser GIS solutions. Demand that your mapping interfaces leverage your enterprise-wide GIS resources natively, are written using mainstream GIS tools and not proprietary solutions, and that you understand that your mapping interface should be the one portal that makes all of your data readily available and usable. If we accept anything less, we are not doing our jobs as public safety officials. **ECPM**

Curt Hinton, GISP, is President of Geographic Technologies Group (Goldsboro, NC). He has more than 20 years of GIS experience. Curt specializes in integrating GIS with existing information technology investments. He has won the URISA and American City and County Excellence in GIS Award, and was named GIS Professional of the Year as voted by NC URISA. He can be reached at chinton@geotg.com.

David Holdstock, GISP, is CEO of Geographic Technologies Group. He has more than 20 years of experience in the use and management of GIS for state, federal and local governments. David has written publications and presentations on GIS for local government. His articles have been published in highly reputable publications. He can be reached at dholdstock@geotg.com.

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BY CURT HINTON AND DAVID HOLDSTOCK

Industry Insight

GIS Implementation

7 Reasons for Failure

and

7 Remedies to Ensure Success

Stories and presentations about GIS success are common. After attending a local GIS conference, users typically walk away feeling that GIS is a "can't miss" technology; it offers all the "bells and whistles" needed to wow an organization.

But a large majority of GIS implementations are less than successful. A sizable amount of them often are utter failures—they don't live up to the promise of enabling an organization with easy-to-use geospatial tools that allow end users a positive and productive experience. Why is that?

The technology has been purported as being "must have" and mission critical for the last 25 years. Shouldn't we have learned from our collective mistakes and not continue to suffer the fate of an underutilized, underappreciated and misunderstood technology?

After a quarter of a century, most implementations are replete with stovepipes of non-coordinated GIS use, and there are many reasons that some GIS implementations don't live up to their billing. We've been inundated with "how to do GIS" literature, sales pitches and presentations, but it might be more instructive to understand how not to do GIS.

Reasons for GIS Failure

1. Key GIS personnel can't communicate. GIS is a compilation of complex technologies that must be sold to an organization. The return on investment (ROI) must be carefully documented and touted, early successes must be attained and trumpeted, and end users must come to an understanding of the technology that has been made available to them.

Unfortunately, this often is where GIS efforts come unraveled. To borrow a line from Cool Hand Luke, "What we have here is a failure to communicate."

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GIS RETURN ON INVESTMENT

IMPROVE EFFICIENCY · INCREASE PRODUCTIVITY · SAVE TIME · SAVE MONEY · MAKE BETTER QUALITY AND MORE EFFECTIVE DECISIONS · IMPROVE DATA ACCURACY · AUTOMATE WORKFLOW PROCEDURES · SAVE LIVES

IMPROVE INFORMATION PROCESSING · COMPLY WITH STATE AND FEDERAL MANDATES · PROTECT YOUR COMMUNITY · IMPROVE COMMUNICATION, COORDINATION, AND COLLABORATION · PROVIDE DATA TO REGULATORS, DEVELOPERS, AND OTHER INTERESTED PARTIES · RESPOND MORE QUICKLY TO CITIZEN REQUESTS · IMPROVE CITIZEN ACCESS TO GOVERNMENT · EFFECTIVE MANAGEMENT OF ASSETS AND RESOURCES

● **Presenting quantitative evidence that GIS is providing a return on investment could save the program.**

So often, GIS staff are technically brilliant but are communication neophytes. They sit in their back rooms and create "whiz-bang" applications, but they fail to communicate with end users or, worse still, don't listen carefully to their needs. Time and again, users testify that GIS staff lord their knowledge over them and seemingly try to dazzle them with their deep knowledge of GIS jargon. This can quickly lead to resentment, and users become jaded with the technology and tune out.

An example from an organization in rural Virginia highlights this "I am the GIS king" mentality. The GIS coordinator in this example was technically brilliant. However, the coordinator came off as having a condescending attitude toward end users and, in an extreme case, referred to an end user as an idiot. Although the implementation was sound and creative from a technical perspective, after six months, 90 percent of the end users detested the coordinator, and soon thereafter the coordinator was fired. It took years for the next coordinator to turn around the end users' opinion of the technology.

The Remedy: Make communication a priority. Talk in layman's terms to end users. Educate them about the technology via user-group meetings, newsletters, GIS Day activities and one-on-one meetings.

2. GIS staff are technologically inept. Although more rare than GIS directors who can't communicate, there are GIS directors who don't really understand the technology and fail to perform most tasks because of a distinct lack of technical knowledge. It's difficult directing projects without knowing how to digitize, develop standards, analyze data, project data or QA/QC data.

Post an online want ad for a high-level GIS staff person. Within an hour, you'll have more than 150 resumes. After a few days, your inbox will be inundated with what appear to be highly skilled professionals ready to lead your GIS to the "Promised Land."

The industry is mature enough now that there are numerous people with qualifications such as advanced GIS degrees and other items detailing GIS prowess. Some of these people truly are what they purport to be, and they can do wonders for an organization. However, many others turn out to be lacking in the technical savvy needed to implement a successful enterprisewide GIS.

All too often, after the hire, it turns out that the employee actually is an adept user of tools such as ArcView, but they're hopelessly lost when faced with the daunting tasks of implementing enterprisewide GIS software, corporate geodatabases, end-user applications, optimal networking, mobile tools and the plethora of technical items that a successful GIS leader must understand.

Examples of GIS implementations that have stalled because the GIS leader doesn't have the technical savvy to implement an enterprise GIS are numerous. Worse yet are the GIS leaders who don't have the technical savvy yet don't realize it. Some lead GIS staff who don't have the needed skill sets realize it and

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hire external resources to augment the areas in which they're lacking.

The Remedy: Ensure that GIS staff members have the knowledge to lead the organization. Take the time to thoroughly test candidates or use external GIS experts to assist with this task. Do not trust resumes. Select the candidate who has the work ethic, technological background and personal characteristics required for the position. Use numerous testing methodologies. If you can't find the right candidate, don't hire.

● Choosing a governance model and creating a plan will provide organization and keep GIS initiatives moving forward.

3. Not focusing on ROI. All too often, organizations do GIS for GIS' sake. They have been to the trade shows, read the magazines and took the GIS plunge. In today's tough economic environment, this isn't sufficient.

Organizational leaders are demanding that technology use has a quantifiable ROI. Unfortunately, many GIS leaders don't know how to or take the time to quantify the effect of their GIS.

One organization in Michigan, for example, recently presented the need for GIS to its city council. The GIS team was presenting the case for the technology, and halfway through the presentation, one councilman stopped the presenter and simply said, "Can we live without this? I need some quantifiable savings that we will attain." The presenter was stumped and couldn't provide quantifiable examples. The GIS effort died and wasn't revisited for another two years.

The Remedy: Develop a business plan for GIS. Focus on the ROI. Document the tangible and intangible benefits of GIS technology. Present these ideas in layman's terms to elected officials. When asking for GIS funding, back it up with quantifiable values in the short and long terms. (A valuable reference containing 16 ROI categories can be found in "Return on Investment: The Key to GIS Implementation," *GeoWorld*, April 2007.)

4. Not showing early successes. A fatal blow for many GIS implementations is a failure to show early successes. It's important to identify key items that can be accomplished early in a GIS implementation.

A GIS initiative in coastal North Carolina ended in failure because the engineer who supervised the GIS effort told his staff that no data should be shared or maps created until all utility base layers were complete and accurate within a few inches of their true location. After a few years of showing no tangible successes, the elected officials defunded GIS, and the effort was scrapped.

The Remedy: Understand the key issues and find ways to use GIS to help. Show these successes early and often. Small successful projects will be extremely beneficial to the overall success of GIS.

5. No GIS plan. A successful enterprisewide GIS implementation not driven by some type of GIS plan is extremely rare—possibly nonexistent. "He who fails to plan is planning to fail" is an accurate adage in the GIS world. Too many organizations are adrift. They move from one GIS project to another with no road map defining the "what and why" of their efforts.

The Remedy: Create or outsource a GIS strategic implementation plan. Even those who have been doing GIS for decades need to create a well-thought-out strategic plan that guides the implementation. If you don't have a plan, then you're not doing your job.

6. No delegation or enabling. The do-it-all mentality of some GIS staff has been the undoing of their organization's
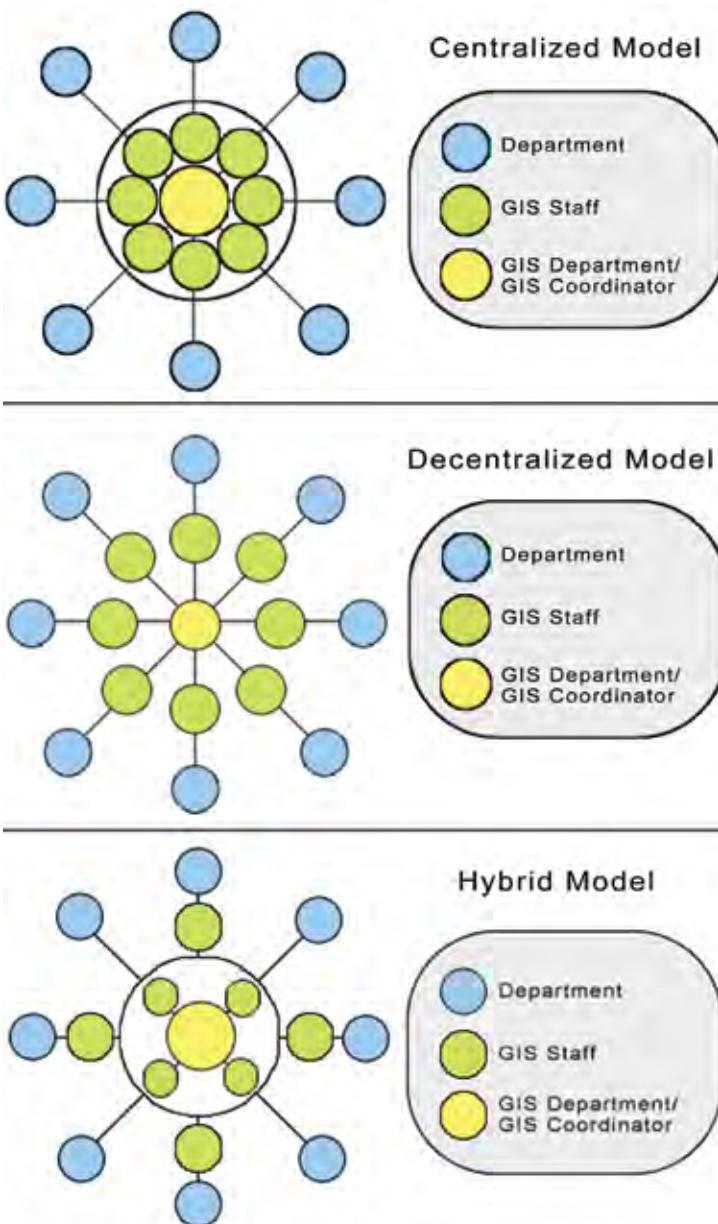
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GIS efforts. Good GIS managers realize that they can't do it all. They understand that they must enable their user base to take on the daily tasks needed to maintain data and create end-user products.

Many organizations have a few GIS experts in a back room and other staff lining up at their door with requests for GIS products. Yes, this makes the GIS staff feel needed, but this model is self-defeating, as the needs of the organization always outstrip what a few GIS experts can provide.

The Remedy: GIS leaders should focus on GIS enablement. Acquire or build tools that enable users to do all of their daily tasks. Enable your users. Distribute and delegate all but the most technical elements of the GIS implementation.

7. No governance model. Numerous organizations are sold on the benefits of GIS and acquire the technology. However, many organizations don't consider how the GIS is to be governed.

Who is going to lead the GIS effort? Who is going to champion the GIS? Who is going to maintain the GIS? These GIS governance items should be decided before GIS is acquired, or the technology will never be successful.

A county in southeastern Tennessee failed because governance wasn't thought through. It purchased hardware and software without adopting any type of GIS governance plan. Less than a year after acquisition, the GIS software was found on a shelf, and the GIS hardware was unplugged and in a corner.

The Remedy: Create the GIS governance plan today. Formalize the roles of all GIS staff and users in the organization. A good governance model has multiple benefits, including clear lines of responsibility and accountability.

There are many other reasons a GIS might fail, such as end-user tools that are too complex, lack of training and lack of integration with existing IT investments. However, it's incumbent on GIS professionals to learn from the mistakes of others. If these failings are understood and not repeated, then enterprisewide successes should abound, and the current paltry 10-percent success rate will be a thing of the past. GW

Curt Hinton and **David Holdstock** are president and CEO of Geographic Technologies Group; e-mail: *chinton@geotg.com* and *dholdstock@geotg.com*, respectfully.

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SAN MATEO COUNTY

GIS NEEDS ASSESSMENT QUESTIONNAIRE

GEOGRAPHIC TECHNOLOGIES GROUP®

SurveyMonkey

San Mateo County GIS Strategic Assessment Questionnaire

1. Introduction

Thank you for taking the time to answer this questionnaire. You may not have the answers to all of the questions, but please answer as many as you can. This questionnaire will augment the on-site interviews.

*1. In which department do you work?

○ Public Works

○ Clerk, Assessor, Recorder, Elections (CARE)

○ Planning and Building

○ Health System

○ Information Services Department (ISD)

○ Sheriff

○ Probation

○ Human Services Agency

○ Parks

○ Housing

○ Public Safety Communications

○ Potential GIS Users (Controller, HR, LAFCo, CMO)

○ Other (please specify)

2. In which division of your department do you work?

3. What is your contact information? (Optional)

Name

Job Title

Phone

Email

4. What are the main functions you conduct within your department/division?

San Mateo County GIS Strategic Assessment Questionnaire

2. Existing Conditions

The following questions focus on the existing and potential mapping needs of your department/division.

1. Do you have a thorough knowledge of what GIS is and what it can do to help improve your ability to carry out your job?

- ○ Yes
- ○ Somewhat
- ○ No

2. Where does your GIS data currently reside?

- ○ Data is stored locally for personal use
- ○ Data is stored on a shared network folder for departmental use
- ○ Data is stored within City's Enterprise GIS for corporate use
- ○ Not Applicable

3. Do you perform GIS data maintenance within the County of San Mateo?

- ○ Yes
- ○ No

If Yes, please list the GIS datasets you are responsible for maintaining

4. Do you connect and access GIS data (including imagery)?

- ○ Yes
- ○ No
- ○ I have not accessed the City's GIS data, but would like to
- ○ I do not need access to GIS

5. Do you use GIS? If so, what percentage of time do you spend using GIS?

- ○ 1-25%
- ○ 26-50%
- ○ 51-75%
- ○ 76-100%
- ○ I do not use GIS

6. What are the primary kinds of GIS/mapping activities you conduct within your department/division? Please choose all that apply.

☐ Using Paper Maps

☐ GIS Data Viewing (i.e. Interactive Map, ArcGIS)

☐ GIS Data Editing (Desktop Software)

☐ Computer Aided Design (i.e. AutoCAD)

☐ Dispatching/Computer Aided Dispatch (CAD)

☐ Mobile Mapping - Tough book/Laptop

☐ Mobile Mapping - Tablet/iPad/Android

☐ Mobile Mapping - Phone

☐ Field Data Editing (Tough book, GPS, etc.)

☐ No Maps at all

Other (please specify)

7. Please check the GIS software applications you use within your department/division:

☐ ArcGIS Server

☐ ArcGIS Desktop

☐ Google

Other (please specify)

8. What analytical tasks do you perform for your department through the use of maps/GIS software?

- ☐ Land Suitability Analysis
- ☐ Development Processing
- ☐ Environmental Impact Analysis
- ☐ Brownfield Analysis
- ☐ Incident Analysis (Crime, Fires, Environmental, etc.)
- ☐ Incident Modeling and Visualization
- ☐ Real Estate Analysis
- ☐ Tax Assessments/Comparables
- ☐ Flow Analysis/Modeling
- ☐ Service Analysis/Planning
- ☐ Optimal Facility Location Analysis
- ☐ Utilizing Aerial Photography
- ☐ Demographic/Population
- ☐ Maintenance Analysis

Other (please specify)

9. What are the shortcomings of your existing desktop mapping system? (i.e. ArcGIS, etc.)

- ☐ Lack access to the system
- ☐ System is difficult/frustrating to use
- ☐ Lack training to use
- ☐ System is too slow
- ☐ System lacks necessary data
- ☐ System lacks necessary functionality
- ☐ Not Applicable

Other (please specify)

10. What are the shortcomings of your existing web/online mapping system?

☐ Lack access to the system

☐ System is difficult/frustrating to use

☐ Lack training to use it

☐ System is too slow

☐ System lacks necessary data

☐ System lacks necessary functionality

☐ Not Applicable

Other (please specify)

11. What are the benefits of your existing desktop mapping system (i.e. ArcGIS, etc.)?

☐ System is simple to use

☐ System has functionality that meets my needs

☐ System provides access to needed data

☐ System provides access to other applications

Other (please specify)

12. What are the benefits of your existing web/online mapping system?

☐ System is simple to use

☐ System has functionality that meets my needs

☐ System provides access to needed data

☐ System provides access to other applications

Other (please specify)

13. Three levels of GIS use within your department/division will be identified. Tier 1 users are Flagship users who coordinate use for an entire department, edit GIS layers, and use GIS on a daily basis, Tier 2 users are users who routinely use GIS to analyze spatial data, and Tier 3 users are GIS viewers/map browsers who use spatial data for information purposes. Please indicate what percentage of the time you would fit within each Tier.

	0	1-20	21-40	41-60	61-80	>80
Tier 1	○	○	○	○	○	○
Tier 2	○	○	○	○	○	○
Tier 3	○	○	○	○	○	○

14. Please describe below how effective the existing GIS is at meeting your needs and the needs of your department/division. What would you like to see continued in the future?

San Mateo County GIS Strategic Assessment Questionnaire

3. Future Needs

1. What kinds of information would you like to see mapped and available via the GIS?

2. What do you expect from GIS and can you give any specific Return on Investment (ROI) examples?

- ☐ Improve Efficiency
- ☐ Increase Productivity
- ☐ Save Time
- ☐ Save Money
- ☐ Make Better Quality and More Effective Decisions
- ☐ Improve Data Accuracy
- ☐ Automate Workflow Procedures
- ☐ Save Lives

- ☐ Improve Information Processing
- ☐ Comply with Local, State, and Federal Mandates
- ☐ Protect Your Community
- ☐ Improve Communication, Coordination, and Collaboration
- ☐ Provide Data to Regulators, Developers, and Other Interested Parties
- ☐ Respond More Quickly to Citizen Requests
- ☐ Improve Citizen Access to Government
- ☐ Effective Management of Assets and Resources

Please elaborate on any checked responses above:

3. What new capabilities would you like to see in terms of a GIS/automated mapping system?

4. What advantages would these capabilities offer from your perspective?

☐ Increased Analytical Capability

☐ Access to Data

☐ Increase Efficiencies

☐ Saved Time

☐ Improve Productivity

Other (please specify)

San Mateo County GIS Strategic Assessment Questionnaire

4. Organizational/Governance Issues

1. Who funds the GIS activities within your department?

2. Have you received any GIS training?

○ Yes

○ No

If yes, what classes?

3. Do you feel that there are clear lines of responsibility regarding the GIS (Data Creation, Data Maintenance, Leadership/Governance, etc.)?

○ Yes

○ No

4. Who do you go to for your GIS/Mapping needs? Please choose all that apply.

☐ I do it Myself

☐ Another Person in my Department

☐ Another Person in the City in a different Department

☐ Another Person Outside of the City

☐ I haven't requested/used GIS to date

Specify Department and/or Person

5. What type of GIS Governance would you like to see?

San Mateo County GIS Strategic Assessment Questionnaire

5. GIS Data Layer Inventory

1. Are there any sources of mapping or database information from other department's/division's that you do not have access to, but would like to? Please list:

2. Are there any GIS data layers that you need, but do not currently have? Please list:

3. Please describe the accuracy of the existing GIS data.

6. Departmental GIS Gap Analysis

As part of the Needs Assessment, a Gap Analysis will be conducted to determine an optimal environment and set of processes for the utilization of GIS. This analysis will provide a baseline level of understanding for the existing status and desired status of major GIS components for the department.

1. Please complete the matrix below to the best of your abilities and knowledge about GIS within your department/division. This matrix details those relevant components that will be analyzed and assessed as part of the Gap Analysis. Each item below needs to be evaluated as Existing (or not), Desired (Yes, No, Limited), and a Priority (Low, Medium, High)

	Existing	Desired	Priority
Automated Vehicle Location (AVL)	▼	▼	▼
Documented Workflows (Standard Operating Procedures for editing, updating, and maintaining GIS data)	▼	▼	▼
Enterprise Systems Integration (Linking information from other databases (i.e. Excel, Access, Work Order Systems) to a point on a map)	▼	▼	▼
GIS Data Access	▼	▼	▼
GIS Data Maintenance	▼	▼	▼
GIS Data Sharing	▼	▼	▼
GIS Personnel (Do you have a need for GIS Personnel within your department to maintain GIS data and help with GIS related projects specific to your department?)	▼	▼	▼
Mapping (Do you have a need to view information spatially on a map? This can be data from other databases, parcel data, aerial photography, utility data, crime data, as well as others.)	▼	▼	▼
Metadata (Do you need to know the derivation of the data you are viewing on a map such as when it was	▼	▼	▼

created, when it was last updated, what the accuracy of the data is, and other pertinent information?)

Mobile/Field GIS Access	⬚ ▼	⬚ ▼	⬚ ▼
Mobile/Field GIS Editing	⬚ ▼	⬚ ▼	⬚ ▼
Routing (Do you have a need to create optimal driving routes for vehicles in the field?)	⬚ ▼	⬚ ▼	⬚ ▼
Software	⬚ ▼	⬚ ▼	⬚ ▼
GIS Extensions (Do you need to perform spatial analysis against GIS data using extensions from Esri? This can include Spatial Analysis, Network Analyst, 3D Analyst, and Geostatistical Analyst.)	⬚ ▼	⬚ ▼	⬚ ▼
Spatial Analysis and Modeling	⬚ ▼	⬚ ▼	⬚ ▼
Training/Education	⬚ ▼	⬚ ▼	⬚ ▼

Please provide any additional information that may be useful:

San Mateo County GIS Strategic Assessment Questionnaire

2. The following is a list of strategic needs as related to GIS. Please select items that you feel are needed within the County:

- ☐ A Strategic Enterprise-wide GIS Plan

- ☐ A Vision for GIS

- ☐ Departmental Goals and Objectives for GIS

- ☐ Committees - Technical, Steering and User Groups

- ☐ Communication, Collaboration and Teamwork Across Departments

- ☐ Intergovernmental or Interdepartmental Agreements

- ☐ A Centralized Corporate Database - One Source for All Departments

- ☐ Roles and Responsibilities

Other (please specify)

3. The following is a list of logistical needs as related to GIS. Please select items that you feel are needed within your department/division and your organization:

- ☐ Technical Support

- ☐ Training

- ☐ Budget Issues and Funding Models

- ☐ GIS Job Descriptions

- ☐ Improve Data Flow in Business Processes

Other (please specify)

# San Mateo County GIS Strategic Assessment Questionnaire

4. The following is a list of technical needs as related to GIS. Please select items that you feel are needed within your department/division and your organization:

- ☐ Data Standards and Digital Submissions

- ☐ Metadata

- ☐ An Enterprise wide Geodatabase Design

- ☐ Data Accuracy Issues

- ☐ IT Infrastructure

- ☐ Architecture

- ☐ Security

- ☐ Streamline Business Processes

- ☐ Additional GIS Software

- ☐ GIS Field/Mobile Solutions

Other (please specify)

5. The following is a list of tactical needs as related to GIS. Please select items that you feel are needed within your department/division and your organization:

☐ A Governance Model for City Use of GIS

☐ GIS Leadership

☐ Definition of the Types of GIS Users

☐ Roles/Responsibilities of GIS Users

☐ Policies and Procedures for Use of GIS

☐ GIS Software - Licensing and Applications

☐ New Digital Data Layers

☐ New Uses for GIS Technology

☐ Utilize More GIS Software

☐ Return on Investment (ROI) Studies

☐ Additional Staff

Other (please specify)

6. Please give us (Geographic Technologies Group) any other feedback you deem important in regards to your use of GIS, the use of GIS within your department, and at your organization.
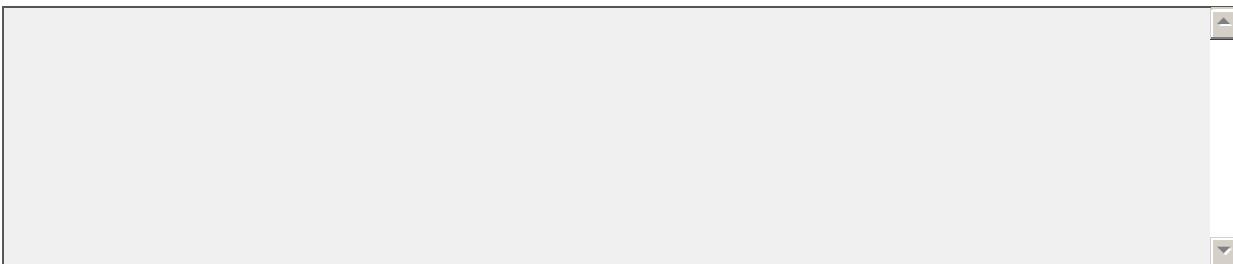
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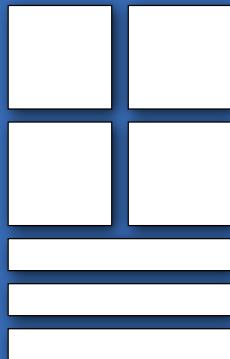
GIS Strategic Implementation Planning

GTG has a unique strategic planning methodology and the ability to explore new ways for local government departments to use GIS technology to improve efficiency, increase productivity, and save time, lives, and money. GTG delivers tailored solutions for towns, cities, and counties.

Data Conversion, Collection, and Creation

Our professional GIS team is skilled in converting paper and digital information into meaningful and reliable GIS databases and data layers. Our services include:

- Scanning
- Geo-referencing
- Data Interpolation and Integration
- CAD to GIS Conversion
- Digitizing to Create Accurate Digital Address Points, Routable Street Centerlines, Building Outlines, Impervious Services, Natural Areas, Police and Fire Districts, and Much More.

Data and Database Migration

Our GIS experts assist local government organizations with the migration of data and databases to the industry standard, including Esri's ArcGIS Server environment. Our expert team successfully integrates legacy data and databases.

Geo-Database Design and Deployment

Our staff has proven expertise in the design and implementation of true enterprise GIS databases. GTG's dedicated professionals design, configure, construct, and deploy accurate, logical, and physical databases.

Architectural and Information Technology (IT) Assessments

The backbone of any successful enterprise GIS is the IT infrastructure. Our team offers in-depth knowledge and understanding in many areas including:

- Multiple Platforms
- Systems Integration
- Hardware
- Software
- Operating Systems
- Networking
- Multiple Peripheral and Mobile Devices

The architecture assessment phase of strategic planning includes a comprehensive review of existing infrastructure conditions, recommendations that provide direction, and an evaluation of infrastructure alternatives.

GIS and Information Technology (IT) Integration

A true enterprise GIS solution offers local government the opportunity to map and analyze many different and disparate databases across the organization. Our staff is experienced in integrating geospatial functionality into organizations' existing technology investment.

GIS Application Development

Our experience and professional services include the design, customization, development, and deployment of true enterprise-wide GIS software solutions. Our understanding of local government operations and business processes has enabled us to develop various GIS applications.

Global Positioning Systems (GPS) Field Inventory

Our professionals use GPS technology to build accurate digital GIS data. GPS and GIS experts work with our clients to design and collect infrastructure data including:

- Street Centerlines
- Address Points
- Water and Sewer Infrastructure
- Stormwater
- Electric Systems
- Natural Gas Networks
- Emergency Response and Patrol Districts
- Natural Resources
- Impervious Services
- Other Digital Data Layers

GIS and GPS Training

GTG offers GIS training workshops for local government, on-site and in the classroom.

GIS Outsourcing and Technical Support Services

Our professionals are available for on-call services and offer hourly and daily rates for GIS consulting services. Our team can create, maintain, and update your GIS data.

Strategic • Technical • Tactical • Logistical • Political
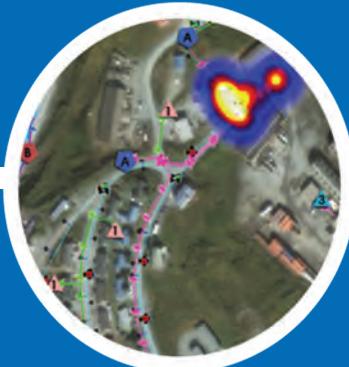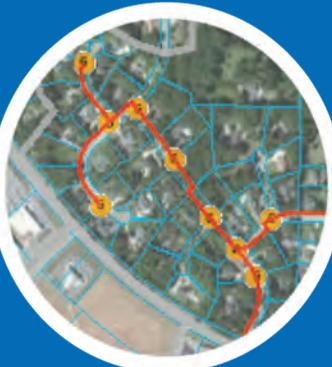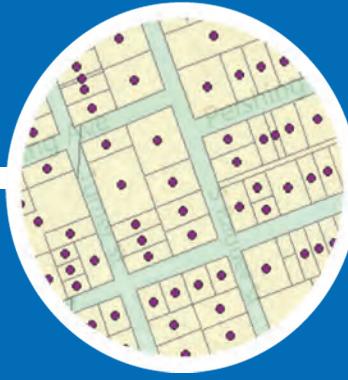
GEOGRAPHIC TECHNOLOGIES GROUP®

Why Select Geographic Technologies Group?

— We'll lead the way!

Incorporated in 1997, Geographic Technologies Group® (GTG®) has a history of providing superior GIS solutions and support to organizations throughout the United States. Conceived and organized specifically to assist local government with planning, designing, and building award-winning GIS solutions, GTG® understands that GIS is not an add-on discipline; it requires a comprehensive and planned approach.

We Understand Local Government
GTG® offers a comprehensive and insightful understanding of local government operations and has a cadre of experts representing all areas of local government: planning, engineering, finance, and information technology. GTG® has worked with towns, cities, and counties across the entire United States to evaluate existing practices and design optimum GIS solutions.

We Assess, Design and Plan
GTG® delivers unique, tailored solutions developed only after carefully analyzing needs, budgets, goals, and resources. The Return on Investment standards ensures that our clients can evaluate the costs of implementation and set priorities. Our strategic implementation planning methodology is unique to the industry. When it is time to implement your plan, GTG® will develop a framework that ensures hardware, software, data storage, best practices, responsibilities, and standards are clearly defined. GTG® strives for continued improvement and client satisfaction by building feedback collection methods into all project plans.

We Have Outstanding Credentials
We have received state, national, tend international awards for tacical government GIS implementation and, more importantly, we have earned the trust and confidence of America's most highly respected local government organizations.